TECHNOLOGY DEPT.

Telephone ENGINEER and MANAGEMENT

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DETROIT

JUNE, 1946

featuring

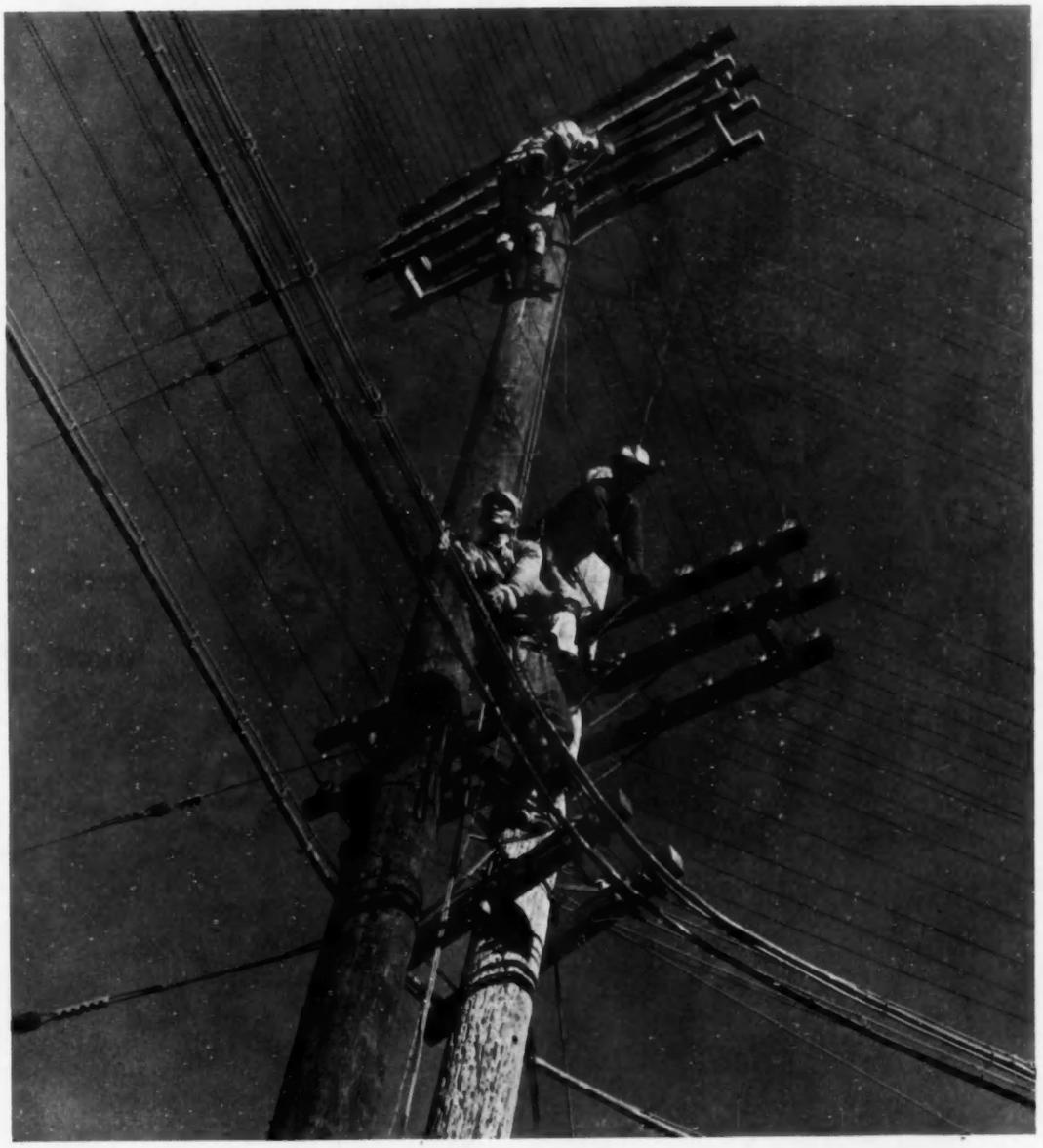
PORTABLE PUMPS and GENERATORS

as well as Radiotelephone Service Progress and many helpful maintenance hints.

Editorial Index on Page 4

THE COVER PICTURE

Thanks to Associated Telephone Co., Ltd., Santa Monica, Calif., for the excellent cover picture which they too have featured in their Clarion. The photograph was made by John Gorst, plant engineer in the Santa Barbara district who has been with the Associated Company since 1928 and is a frequent contributor of photographic items of the news on their system.



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THE MAGAZINE OF THE TELEPHONE INDUSTRY

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THE WISEST INVESTMENT A MAGNETO EXC NGE

ORDER FORM LEICH SALES CORPORATION—427 W. RANDOLPH STREET—CHICAGO 6, ILL.

FILL IN QUANTITIES HERE

Please send us the following No. 86 Magneto Wall Handsets:

.....86A-1000.....	1000 ohm ringers.....	@ $23.90
.....86A-1600.....	1600 ohm ringers.....	@ $24.05
.....86A-2500.....	2500 ohm ringers.....	@ $24.35

NAME OF COMPANY.....

ADDRESS..... CITY AND STATE.....

BY..... TITLE.....

LEICH MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

NGE CAN MAKE

LEICH'S EIGHTY-SIX
COMPLETE MAGNETO HANDSET

Here is a magneto telephone you'll be proud to install. And glad you did too. For years afterwards.

This Leich No. 86 is a complete magneto wall telephone except for the batteries. Its modern all-Bakelite case and attractive, compact appearance appeal to both town and country subscribers. Transmission is excellent, even on the longest, most heavily loaded lines.

The special Alnico generator has a greater output than the average 5-bar generator. Thus, this one telephone will replace all 3, 4 and 5-bar models.

If the subscriber wants a desk set, you merely separate the desk set and generator box. (Time—a few minutes; cost—$1.78 for felt base for desk set, bakelite cover for generator box and handset stand cord).

Thousands of these Leich No. 86 telephones are now in service. Users report that transmission and reception are the finest they have ever known.

On every consideration—subscriber satisfaction, efficient operation, wide adaptability and long, trouble-free service life—you can count on this Leich No. 86 Magneto telephone to be a wise investment. Check your needs and order now. Use the order blank on the opposite page.

All-Purpose Alnico Generator

Half as big as the ordinary 5-bar generator yet more powerful. Can be used in 3, 4 or 5 bar generator installations.

Easily Converted to Desk Set

Separate Desk Set from generator box, put cover on generator box, felt base on desk set, add a desk set cord and you have a modern magneto desk handset.

Built to Last

In design, workmanship or materials, you won't find a better telephone instrument. Thirty-nine years of telephone manufacturing experience are behind this modern Leich telephone.

"It Seems to Us"

Conventions do get people well acquainted, but at the last USITA Conference it looked like the Edgewater Beach tried to help with the mixing. I. F. Krehbiel, Commercial supt., Interstate Telephone Co., Spokane, Washington tells us that Glen Stover of Mt. Vernon, Washington was assigned a room with a telephone executive from Tampa, Fla. It isn't hard to imagine the fish stories told in that room by first our telephone man from the Gulf and maybe matched by Mr. Stover about the Pacific.

•

Jack Haley, the new executive secretary of the Texas Telephone Association, is all set in his office at Austin. A recent note informs us that he is relishing every day of his work although the recent train strike slowed him down a bit.

•

The telephone convention at Syracuse, N. Y., stranded many in attendance. The short-lived rail strike in retrospect had its humorous moments. We doubt, however, that Chicagoans Mr. and Mrs. Herbert Lello, Leonard Ruggles, Dan McNulty and Chester Ruth saw much humor in their group taxicab ride from Syracuse to Chicago after the convention. All or any of the above can spin quite a yarn about this ride if you ask them.

•

The Denning Mfg. Co., Cleveland, Ohio, who make quality dies for metal stamping precision parts for telephone equipment, are nicely settled now in their new location, 2024 East 70th Street.

•

J. K. Johnston, that grand old man of the Independent Pioneers, informs us the advertising program of the Independent manufacturers and the trade magazines has resulted in many new members to that group. If you have 15 years service to Independent telephony, write Mr. Johnston for application blank — Lemcke, Bldg., Indianapolis.

TELEPHONE ENGINEER & MANAGEMENT

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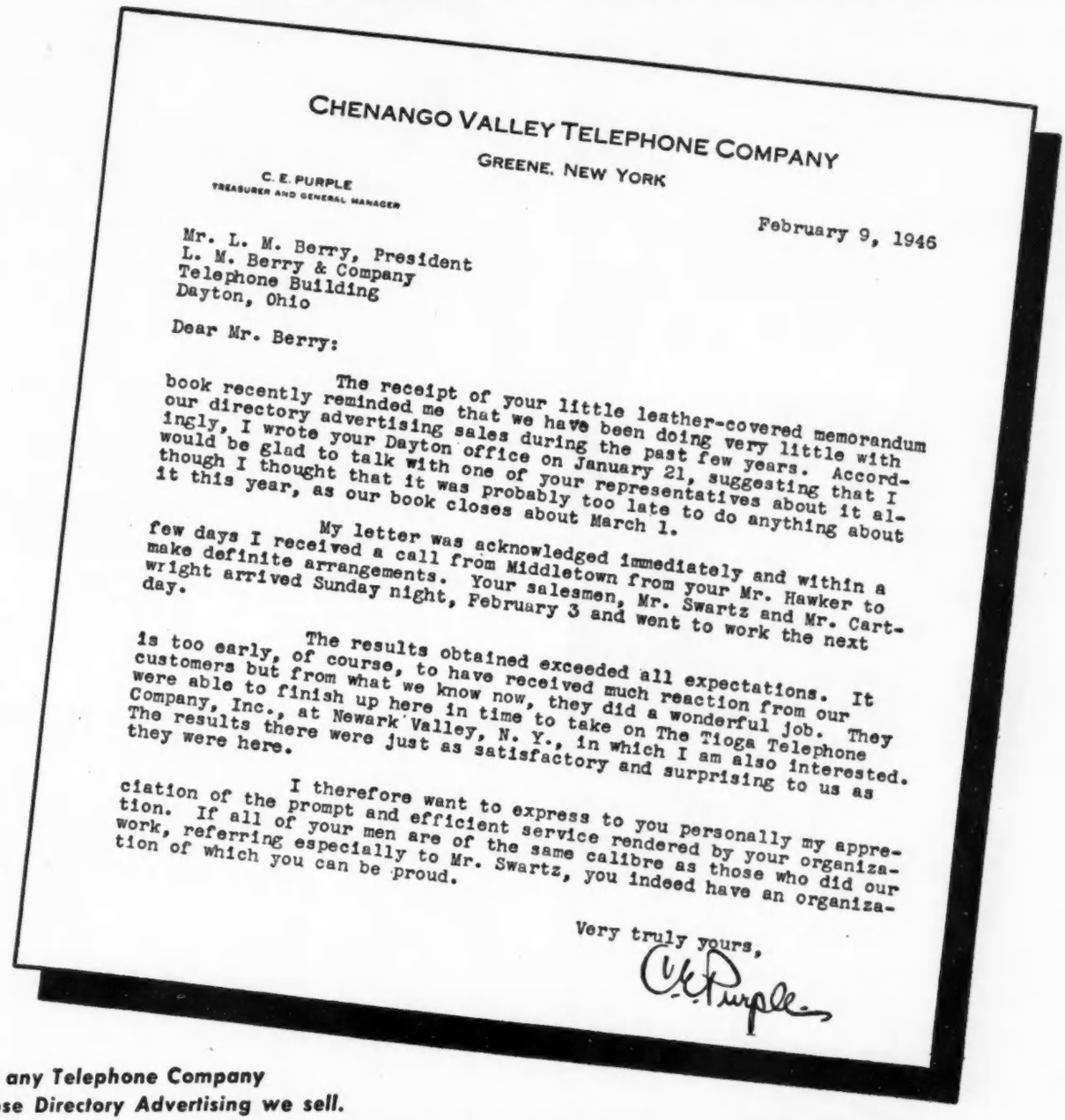
Founded in 1909

Office of Publication, Pontiac, Illinois. Executive and Editorial Offices, 7720 Sheridan Road, Chicago 26, Ill. Phone Rogers Park 3040. RAY W. SMITH, Editor; ROY F. SMITH, Adv. Manager, DON C. SORENSEN, Sales Prom. Mgr. Subscriptions: U. S., Cuba, Mexico $1.50 Per Year; Canada, $2.00; In all Other Countries, $3.50. Single copies, U.S.A., 15 cents. Single copy JANUARY 15 BLUE BOOK BUYER's GUIDE $1.00. All subscriptions should be sent DIRECT to 7720 Sheridan Rd. Chicago 26, Illinois.

"A Satisfied Customer is the best Advertisement"

• • • An old saying but just as true today as ever. Read the unsolicited letter below from one of our new telephone customers. It is typical of many we receive from old and new customers.



CHENANGO VALLEY TELEPHONE COMPANY

GREENE, NEW YORK

C. E. PURPLE
TREASURER AND GENERAL MANAGER

February 9, 1946

Mr. L. M. Berry, President
L. M. Berry & Company
Telephone Building
Dayton, Ohio

Dear Mr. Berry:

The receipt of your little leather-covered memorandum book recently reminded me that we have been doing very little with our directory advertising sales during the past few years. Accordingly, I wrote your Dayton office on January 21, suggesting that I would be glad to talk with one of your representatives about it although I thought that it was probably too late to do anything about it this year, as our book closes about March 1.

My letter was acknowledged immediately and within a few days I received a call from Middletown from your Mr. Hawker to make definite arrangements. Your salesmen, Mr. Swartz and Mr. Cartwright arrived Sunday night, February 3 and went to work the next day.

The results obtained exceeded all expectations. It is too early, of course, to have received much reaction from our customers but from what we know now, they did a wonderful job. They were able to finish up here in time to take on The Tioga Telephone Company, Inc., at Newark Valley, N. Y., in which I am also interested. The results there were just as satisfactory and surprising to us as they were here.

I therefore want to express to you personally my appreciation of the prompt and efficient service rendered by your organization. If all of your men are of the same calibre as those who did our work, referring especially to Mr. Swartz, you indeed have an organization of which you can be proud.

Very truly yours,

C. E. Purple

Ask any Telephone Company whose Directory Advertising we sell.

Selling Telephone Directory Advertising in over 3,300 Cities and Towns in the United States and Canada.

L. M. BERRY and COMPANY

Telephone Directory Advertising Exclusively

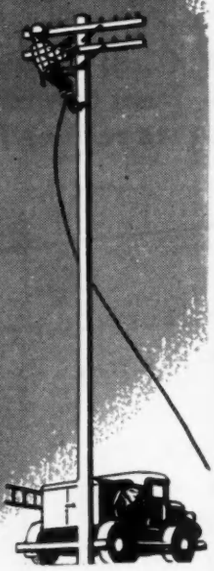
TELEPHONE BUILDING, DAYTON, OHIO

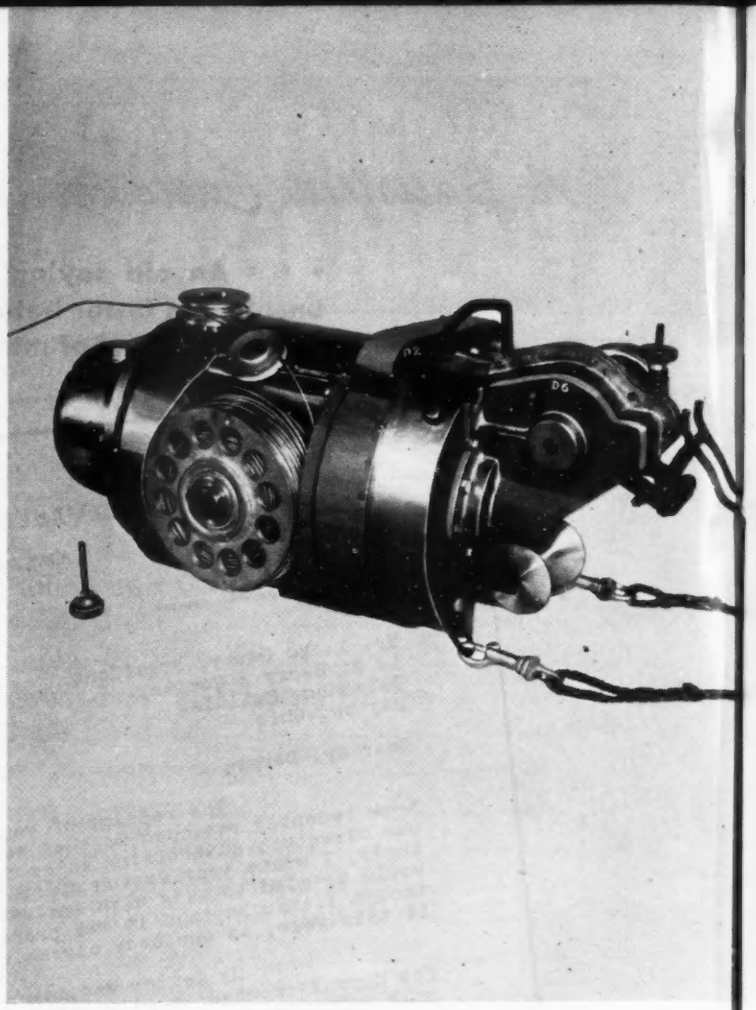
Telephone LD-Loop 16

Telephone ADams 4127

The Satisfaction Lasts When You Buy Products

Recommended and Guaranteed **by KELLOGG**





LOWER COSTS ON NEW CONSTRUCTION! The Model "D" Neale Cable Spinner, made by CABLE SPINNING EQUIPMENT CO., operates smoothly under all conditions. Double-drive mechanism insures evenly spaced spirals, spun under steady tension. Ratchet locks spinner in place on strand whenever pull on tow line is released. Detachable ring pusher moves temporary rings ahead of spinner.

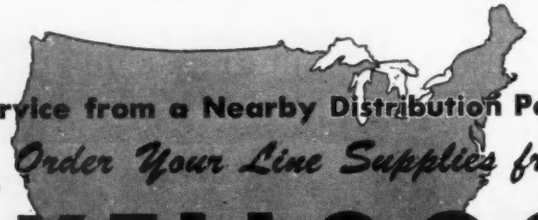
SEALED AGAINST TROUBLE. Leading manufacturers of communication equipment rely on KESTER Rosin-Core Solder to eliminate high-resistance joints and intermittent open-and-closed circuits. It permanently seals joints and protects them against service troubles. The special flux used in this KESTER SOLDER CO. product does not cause corrosion or injure insulating materials.

There's three-way satisfaction when you concentrate purchases of line supply and construction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 50 strategically located distribution points.

KELLOGG SWITCHBOARD & SUPPLY COMPANY

Factory and General Offices: 6650 S. Cicero Avenue, Chicago 38

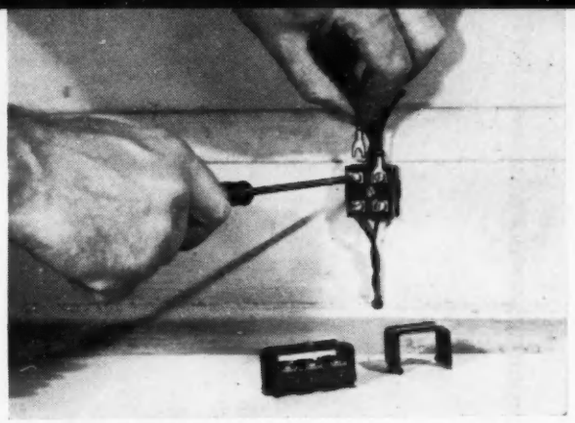
Branch Offices: Kansas City, San Francisco, St. Paul, Los Angeles



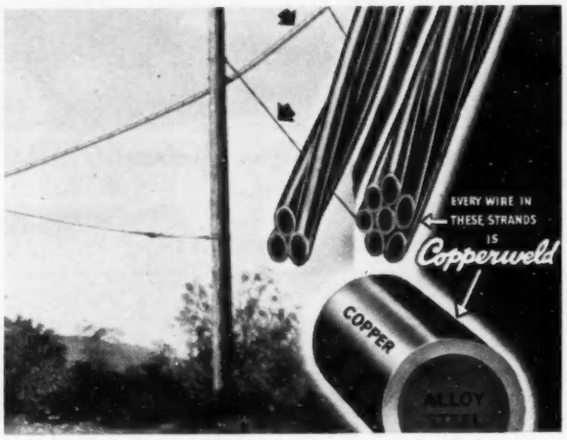
For Service from a Nearby Distribution Point

Order Your Line Supplies from

KELLOGG

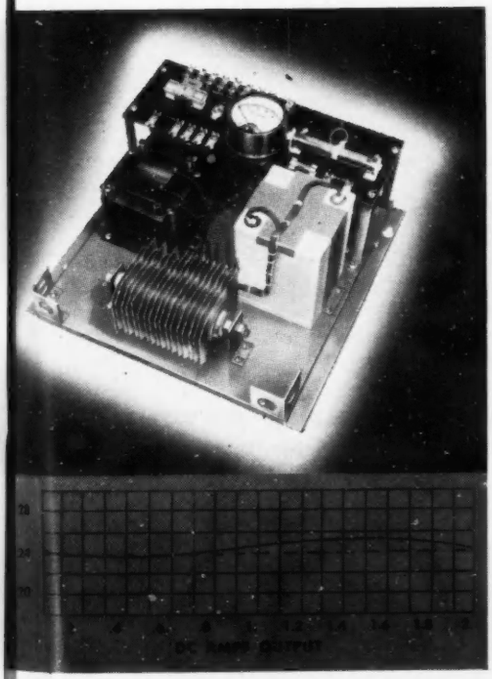


HAS ALL THE ANSWERS! Kellogg Connector Blocks have every feature needed to save installation time and assure foolproof connections. U-shaped gripper plates take spade or spike tips on any size wire. Block is shaped to hold tips in place without lateral movement. In 2 and 3-point sizes.



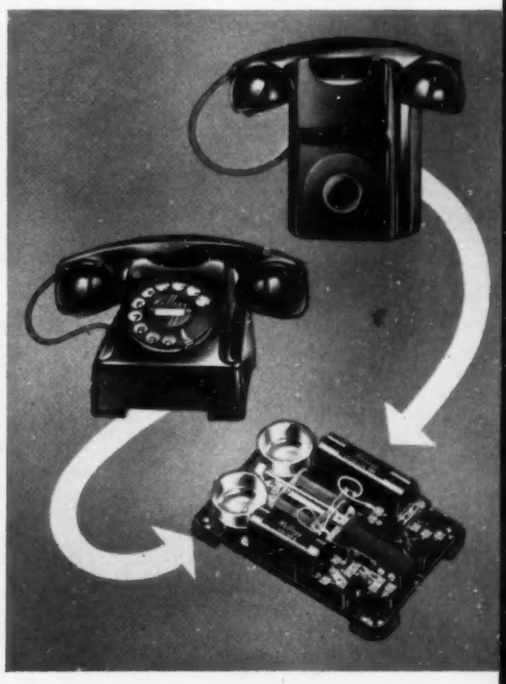
NON-RUSTING STRAND. There's no loss of strength due to rust when you use Copperweld Strand—for Coppeweld has the rust resistance of solid copper. The thick protective covering of copper is permanently molten welded to the alloy steel core. Made by COPPERWELD STEEL CO.

BUILT TO "TAKE IT"! The Cook Type "O" Sub-Station Protector, with grounded non-corrosive Everdur hood, fitting tightly to sides and bottom, is ideal for both indoor and outdoor use. A product of COOK ELECTRIC CO. The low-absorbent porcelain body is designed to prevent surface leakage. Equipped with one pair of fuses and one pair of high potential discharges. Will take fuses of various types and lengths.



STEADY DC VOLTAGE, required by switchboard lamps and telephones (especially dial), can always be assured when you use a RectiFilteR. Made by RAYTHEON MANUFACTURING COMPANY, it operates from regular AC source. And with no moving parts to wear, maintenance is low.

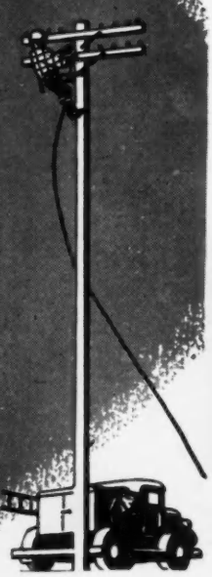
DEPENDABLE describes "Everyeady" "Columbia" "Gray Label" Telephone cells. Dependable because they are manufactured by NATIONAL CARBON CO., INC. under rigid laboratory controls that assure uniform high quality—extra days of service. Dependable because their sustained voltage means improved transmission.

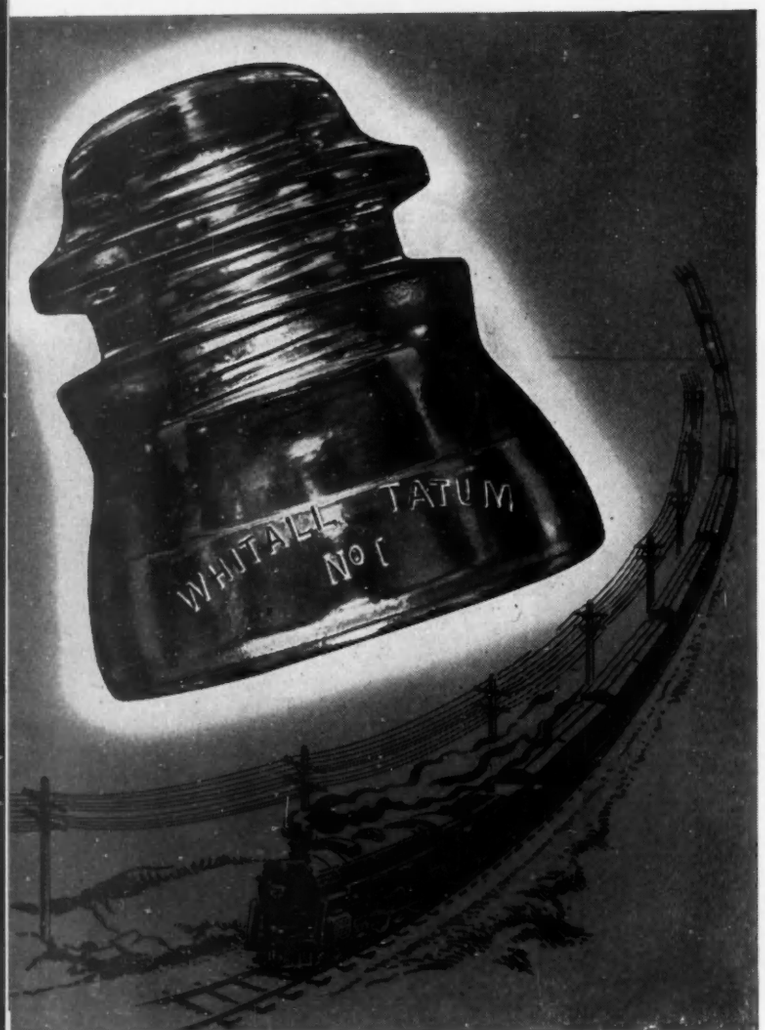


SIMPLICITY is the keynote of the amazing new KELLOGG 1000 Series Masterphone. One base plate and two housings can be adapted to meet every subscriber need in desk or wall types. All components are simply plugged or screwed into position on the one base plate.

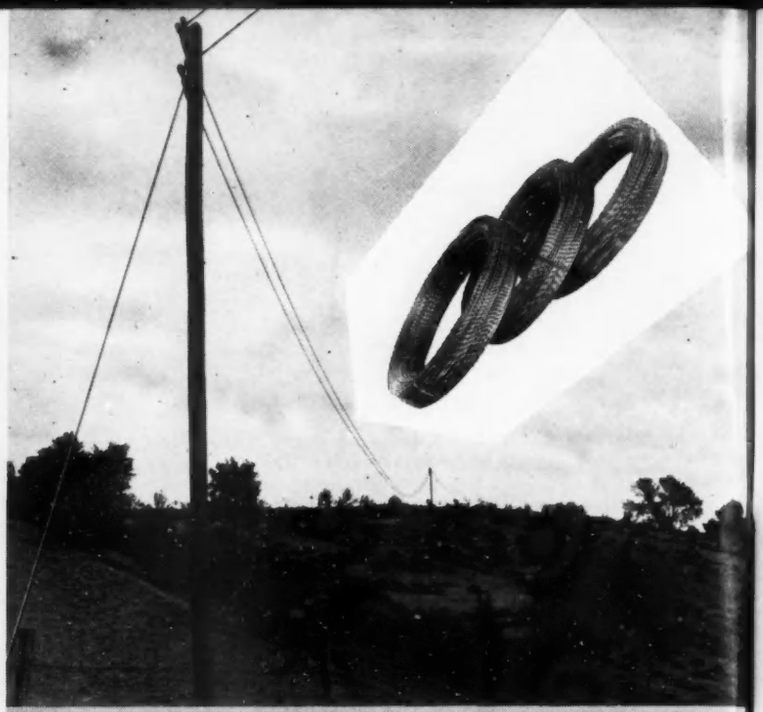
The Satisfaction Lasts When You Buy Products

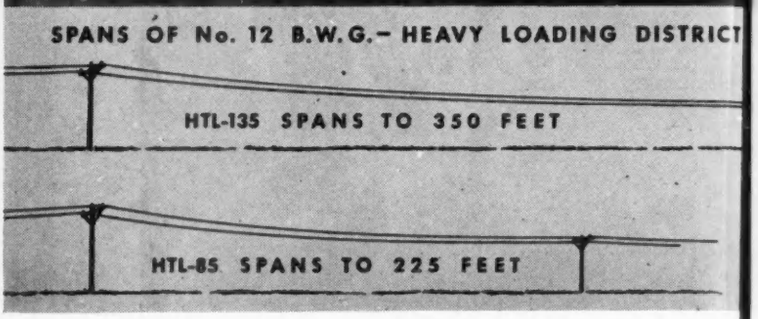
Recommended and Guaranteed by KELLOGG





MEET EVERY SERVICE NEED. No matter what your requirements, there is a size and style of Armstrong's Whitall Tatum Insulator to meet it. Made by ARMSTRONG CORK CO., they feature crystal clarity of glass, accurate gaging, and unusual resistance to temperature changes. For lower maintenance costs, use Armstrong's Whitall Tatum Insulators.





SAVE TWO WAYS on line wire replacement and construction by standardizing on INDIANA STEEL & WIRE CO.'s Crapo HTL-135 and Crapo HTL-85 Line Wire. The high tensile strength of these wires permit long spans and enable you to realize large savings in construction and maintenance costs. Galvanized by the famous Crapo Galvenizing Process.

There's three-way satisfaction when you concentrate purchases of line supply and construction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 50 strategically located distribution points.

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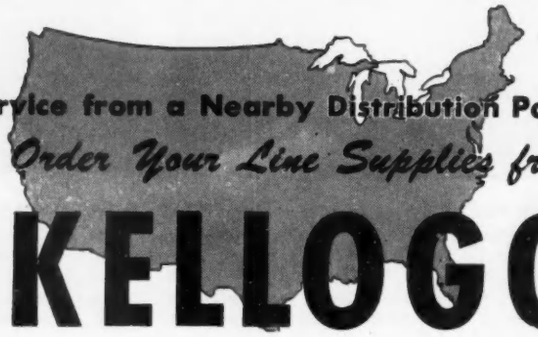
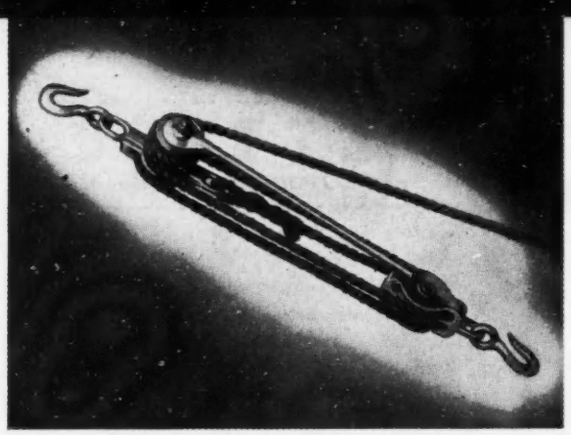
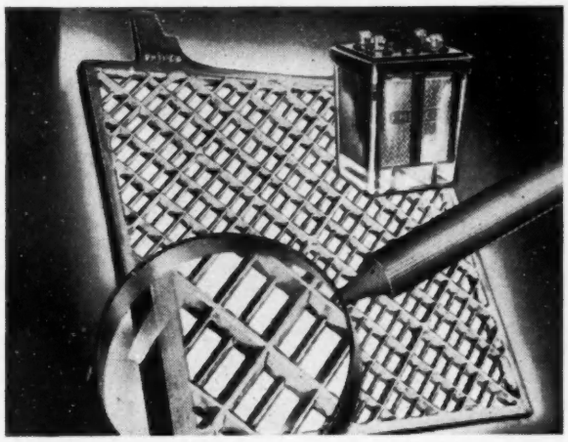


For Service from a Nearby Distribution Point
Order Your Line Supplies from
KELLOGG

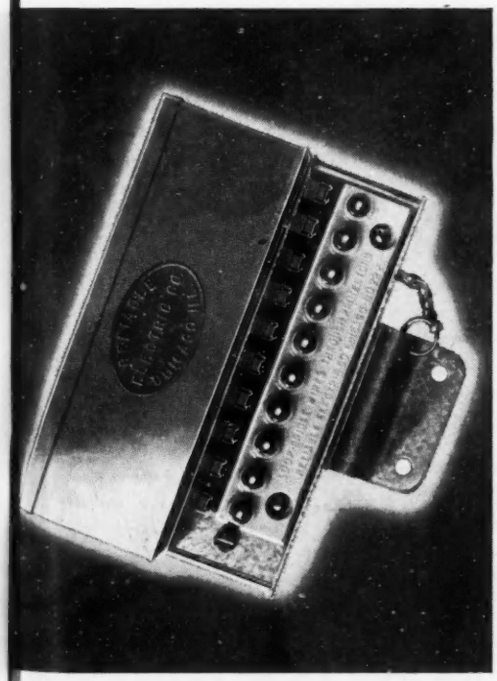


A "MUST" FOR EVERY LINE CREW. Chance Pulley Blocks were especially made for line construction and maintenance work. Light weight for easy handling. Operate with a ratchet action, having a leverage ratio of 32 to 1. Made by A. B. CHANCE CO. in 4 sizes, capacities from 2000 to 5000 lbs.

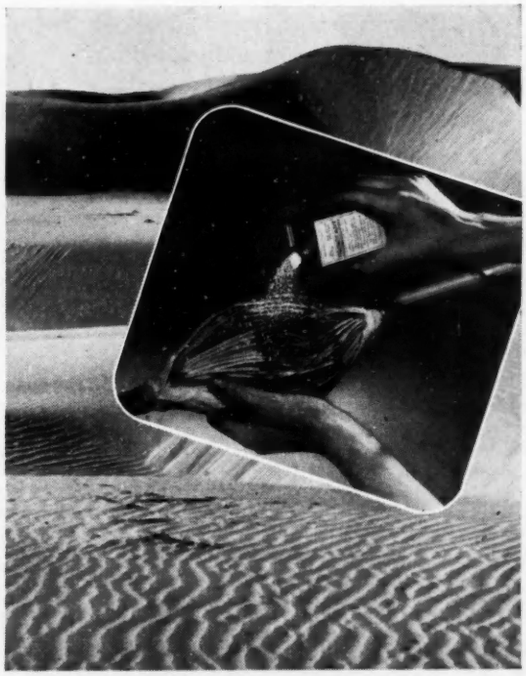


FOR FULL FLOAT SERVICE. Every PHILCO Telephone Battery has the famous Flotè grid developed specifically for full float service. The design and metal in Philco Flotè grids represent a marked advance resulting in greater electrical efficiency, the elimination of low cells and longer life.

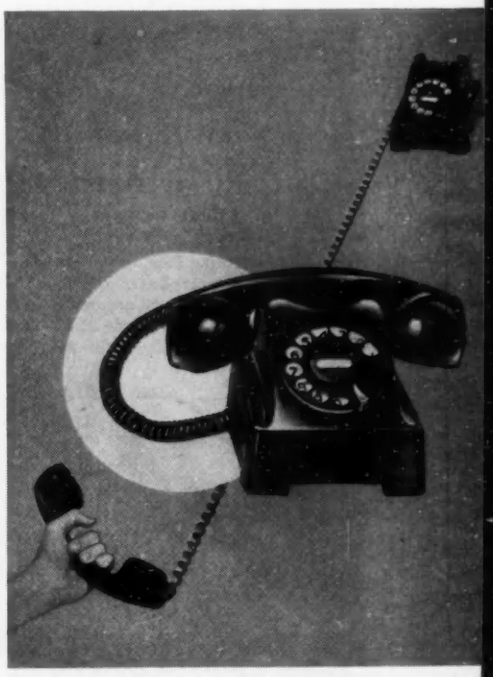
EASY CUTTING QUALITIES and expert workmanship are combined in the No. 777 Two Hand Pruner, made by BARTLETT MANUFACTURING COMPANY. This finely-constructed tool is designed to make pruning an easier, faster, more thorough job. Both blade and hook are made of hardened drop forged crucible tool steel for durability and leave clean cuts without injuring the bark.



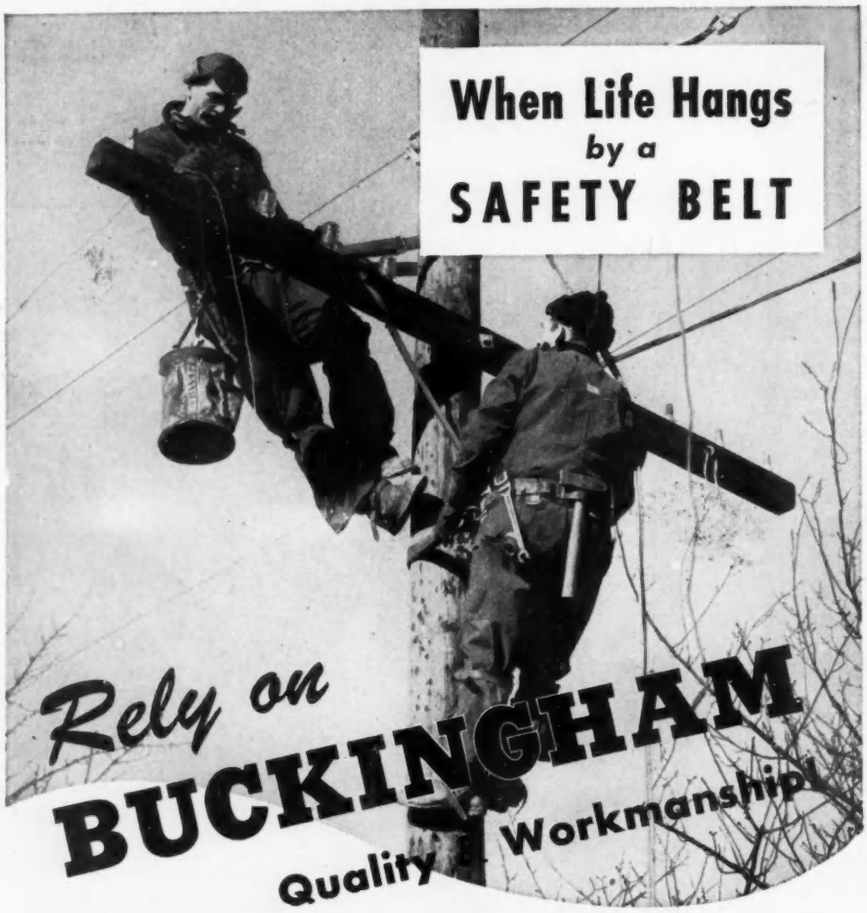
FOR DEPENDABLE PROTECTION, use No. 222 Outdoor Arrester. This RELIABLE ELECTRIC CO. unit is widely used in connection with protected and unprotected cable terminals on long sections of open wires or drop wires. It features the famous Reliable self-cleaning sawtooth discharge blocks.



DRIER THAN THE DRIEST DESERT! Drierite Desiccant is the safer way to dry out splices in lead covered cables. After splicing, sprinkle Drierite granules among the conductors. This W. A. HAMMOND DRIERITE CO. product absorbs all moisture, makes the splice about the driest part of the cable. Conductors are safe.



NOT A KINK IN A CARLOAD. Kellogg Koiled Kords always stay out of the way and thus help reduce telephone breakage caused by dangling cords. The outer rubber cover is permanently molded in spiral shape, thus assuring natural, uniform retractability. An exclusive KELLOGG product.



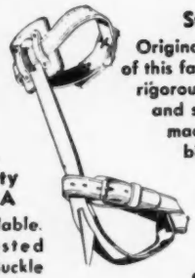
● High in the air . . . haunted by the hazards of carelessness, hot wires, or equipment failures . . . that's when the security of BUCKINGHAM safety equipment eases the physical and mental tension, and enables linesman to do their best work. Fatigue is lessened. Discomfort held at a minimum. And behind it all is a 45-year reputation for quality, workmanship and advanced design that has made Buckingham equipment a favorite all over the United States.

Write for Catalogue 24 showing the complete Buckingham line.

Buckingham distributors in many principal cities

Buckingham Easy Belt No. 58

Floating Feature insures full tool loops under all conditions. No rivet heads or metal contact the body. Made of tan harness leather and lined with soft chrome lace leather.



Stephens Climbers

Originator and sole manufacturer of this famous climber, Buckingham rigorously maintains the quality and safety standards that have made them a favorite with big users for 45 years.

Buckingham Standard Safety Strap No. 42A

Safe and dependable. Drop-forged, tested snaps and buckles. Buckle end reinforced with metal to increase strength and wear. Made from backs of best selected harness leather.

Buckingham Spur Protectors

Keep your spurs sharp and give your climber longer life.

Buckingham MANUFACTURING CO., INC.

Walter E. Craw, President — 5-7 Travis Street, Binghamton, N. Y.

LETTERS

from TELEPHONE ENGINEER readers

Dear Sir:

We have found the following method of planting dynamite for blasting poles in quicksand very satisfactory. It was introduced to us by one of our employees who recently returned from service with the U. S. Coast Guard.

Use a 2" pipe 5' or 6' in length with straight handles welded or bolted to one end for easy pulling. Dig the pole hole with a shovel until quicksand is reached, place pipe in upright position in center of hole and place a regular 1¼" x 8' digging bar, point end down, into the pipe. By working the bar up and down with a dasher motion and keeping it well below the bottom of the pipe, the pipe will soon drop down to the depth desired. Quite often it is necessary to hold the pipe up so as to keep the point of the bar working below the pipe. It would appear that the pipe would partially fill with sand but it does not.

Sink the pipe to the depth the hole is to be set, remove the bar and depending on depth of setting, place ½ to 1 stick of dynamite (loaded with an electric cap with wire leads long enough to extend above surface of ground) in pipe. Hold charge down with a long straight stick while dynamite pipe is being pulled out by its handles. Set pole over charge and guy it in straight upright position with ropes. We use a piece of No. 17 drop about 100' long to attach to the wire leads on the electric cap and set off the charge with the truck battery or 3 or 4 dry cells.

The pole will usually drop to the proper depth when charge is exploded, but it is sometimes necessary to rock the pole until it settles to the proper depth. It is advisable to place a chalk mark on the pole at the depth it is to be set.

We have used dynamite in setting poles in quicksand for several years and find it very satisfactory. We have always driven the pipe using either a hinged trap, a pointed wooden plug or a piece of sheet metal over a pointed pipe to keep the pipe from filling with sand, but we find that the bar and pipe method explained above to be the quickest and easiest method we have used.

One of the power companies in our locality have a large air compresser and had very good success in setting poles in quicksand by the jet air method.

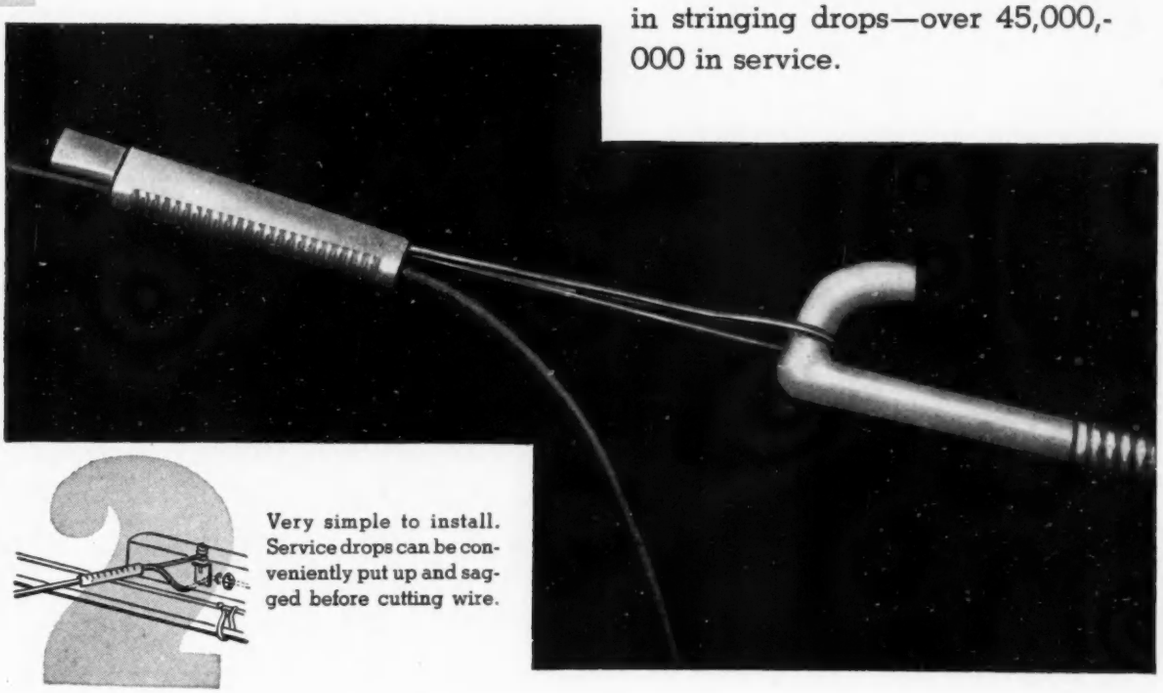
Yours truly,

C. H. Behnke
Division Plant Supt.
Tri-County Telephone Co.
Alpena, Michigan

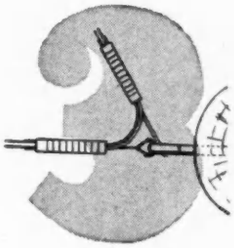
Reliable
because...

Employing a wedge principle, Reliable Drop Wire Clamps tighten automatically under load with the assurance of a firm grip without damaging insulation.

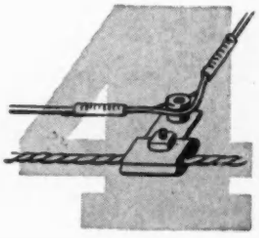
—years of field service have more than confirmed the superior features of the Reliable Type P Drop Wire Clamp. Their widespread use has proved a pronounced economy in stringing drops—over 45,000,000 in service.



Very simple to install. Service drops can be conveniently put up and sagged before cutting wire.



Non-corrosive metals are used throughout. A large margin of strength above actual field requirements is provided. Clamps can be re-used.



A universal clamp for any type of drop wire dead-end. Fits all makes of hardware and can be used with any standard make of twisted pair or parallel drop wire.

RELIABLE
ELECTRIC COMPANY
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Backed by a half-century of experience, the finest of materials, and craftsmen working with the most modern machines, General Cable offers you the best in quality and service.

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AUTOMATIC ELECTRIC COMPANY
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AUTOMATIC ELECTRIC
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71 YEARS AGO THIS MONTH

Watson twanged a spring and the telephone was born

Important discoveries, usually the results of long, patient effort, occasionally come with startling suddenness and from unexpected sources. Thus it was with the telephone. As Bell and Watson were experimenting on June 2, 1875, the movement of the spring in the transmitter suddenly stopped. Watson plucked it to start it vibrating again. Bell, with his ear to the receiver, instantly recognized the undulating variation in tones . . . knew that his hard work and persistence had brought success . . . and the telephone was born.

Hard work and persistence on the part of many thousands of telephone workers have followed through the 71 years since Bell made his important discovery . . . bringing to the world the marvelous telephonic advantages we enjoy today. The telephone tradition of faithfulness and dependability has become a symbol of progress . . . a promise of other great achievements to come.

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In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

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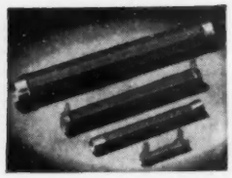
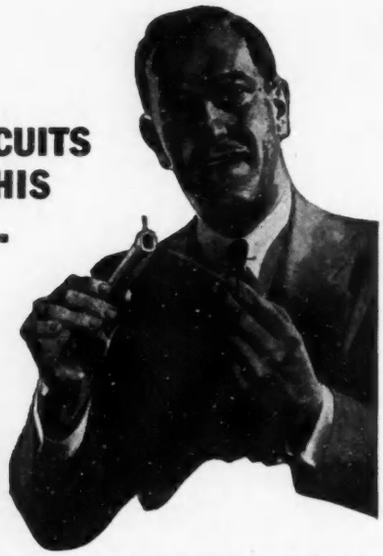
FOR VHF CIRCUITS YOU WANT THIS RESISTOR . . .





Ward Leonard Non-Inductive Bulletin 21 Resistors were designed especially to meet the exacting requirement of high-frequency applications. The unique design of the Ward Leonard Refractory accurately fixes the points at which the Ayrton Perry Windings cross. This reduces inductance and distributed capacitance to an absolute minimum. Bulletin 21 Resistors are Vitrohm Resistors with the desirable characteristics of all Ward Leonard Vitrohm Resistors.

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OAK BRACKETS

Oak pole brackets of unquestioned quality are in demand now as never before in the face of the qualifications necessary in the equipment and materials needed today to "keep 'em talking." Present day maintenance and repair have every reason to demand and get only the best.

GLASS INSULATORS

Research and experiment have produced in Hemingray insulators a glass insulator that is better than any ever before offered.

Non-porous, non-deteriorating, uniform coefficient of expansion and high mechanical as well as high dielectric strength are some of the many qualities that rank Hemingray the "best on the line."

BUCKEYE TELEPHONE and SUPPLY CO.
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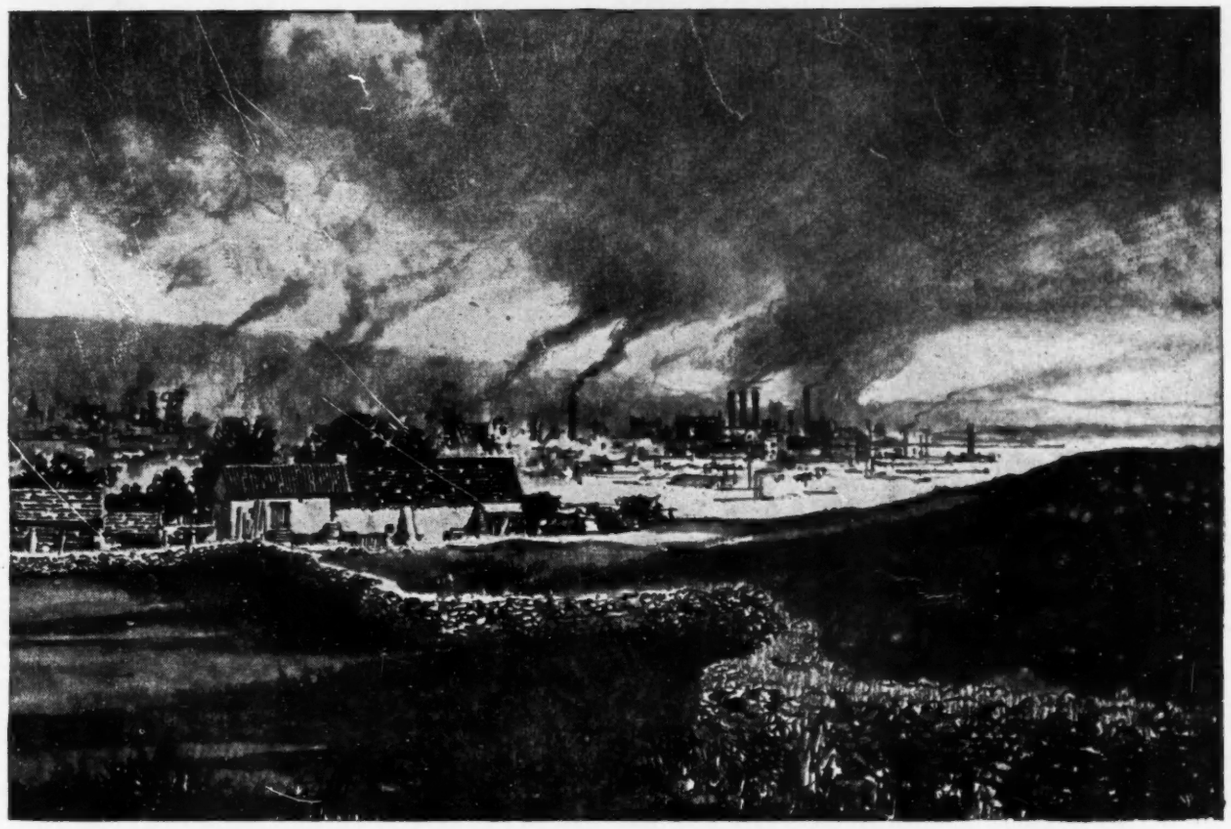

IN THE HIVES OF INDUSTRY

The Earth is a vast storehouse containing everything for the support of human life, whilst to man has been given the power to work with his hands and to apply the inventive genius of his brain. The construction of manual and machine tools and the manufacture with their aid, of small articles and bulk commodities is generally highly localised; its situation is controlled by the presence of a coalfield, a mineral deposit or the like. There arise the industrial districts . . . towns of furnaces and trip hammers, whirring machinery and smoking chimneys. To provide telephone service for their incessant internal activity several main automatic telephone exchanges of moderately large capacity are required. The swift, scientific precision of Strowger Automatic Telephone Equipment, its mechanical speed and efficiency and its inhuman ability to work unceasingly and untiringly are strikingly appropriate to the ever-increasing numbers of Hives of Industry for which it is providing service.

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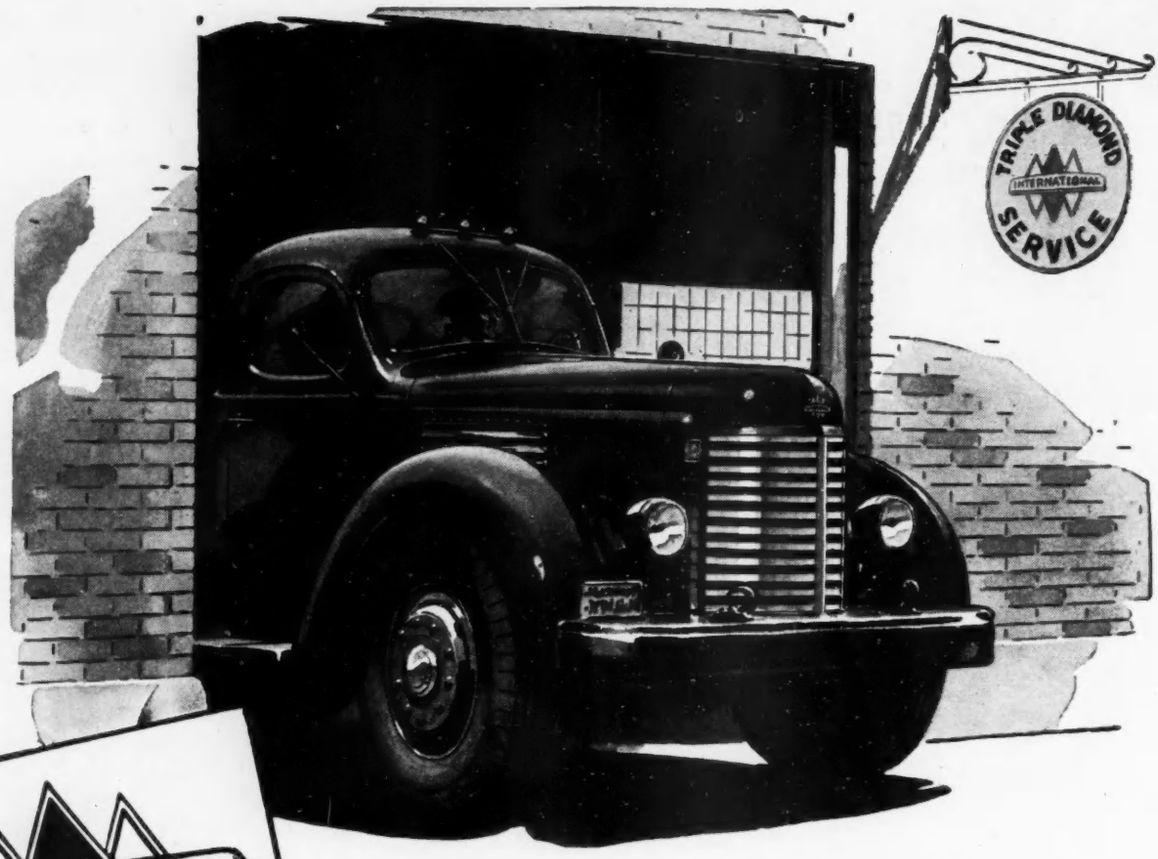
- *has the function of a subscriber's "key" which "opens the door" to all other subscribers.*
- *has the advantage of being international in its application; there is no language problem in its use.*
- *has its speed controlled by a centrifugal governor with a normal setting giving a speed of ten impulses per second.*
- *has an impulse period of 100 milli-seconds duration of which 66.6 milli-seconds are a "break" period and 33.4 milli-seconds are a "make" period.*
- *has a "free wheel" action which prevents return motion of the finger plate from the finger stop from affecting operation.*
- *has mechanism which masks the equivalent of two impulses to increase the time between dialling one number and the next; this ensures that the automatic exchange equipment has ample time to complete its switching functions.*
- *has complete protection from extremes of heat, humidity, dust-laden atmospheres, etc.*
- *has the spring assembly in the form of a self-contained unit; various combinations of shunt springs can be supplied if necessary to suit different types of telephones and circuits.*
- *has a specially constructed worm-wheel with an oil impregnated fibre washer which renders it self-lubricating.*
- *has a ratchet mechanism with teeth punched and shaved to ensure absolute uniformity.*
- *has many points of design which enable adjustments to be made simply and quickly on subscribers' premises.*



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This emblem identifies the nation's largest company-owned truck-service organization—International Branches—and International Truck Dealers everywhere.

5 Reasons Why
INTERNATIONAL SERVICE
Can Help You Meet Rising Truck Operating Costs

1. Mechanics who furnish International Service are *truck* mechanics—specialists in truck service.

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International Truck Service is supplied by a national network of International Truck Dealers and by International Branches—the nation's largest company-owned truck-service organization. It is available for trucks of all makes and models.

In the present critical truck situation, International Truck Service is your best bet to keep operating costs at practical levels and to minimize chances of highway failures. You will find an International Branch or Truck Dealer within easy driving distance. Get in touch with him today.

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For more than 30 years, the name "Copperweld" has been the mark of copper-covered steel wire made by Copperweld Steel Company's exclusive Molten-Welding process. And—because Copperweld products have proved their dependability and economy throughout this long period—the following facts are vitally important to you:

1. COPPERWELD is the only wire made by the Molten-Welding process—in which a thick covering of protective copper is permanently and continuously welded to a core of strong alloy steel. The perfect interlocking of these two metals, accomplished only by molten-welding, provides rugged strength, high conductivity, rust-resistance and long life.

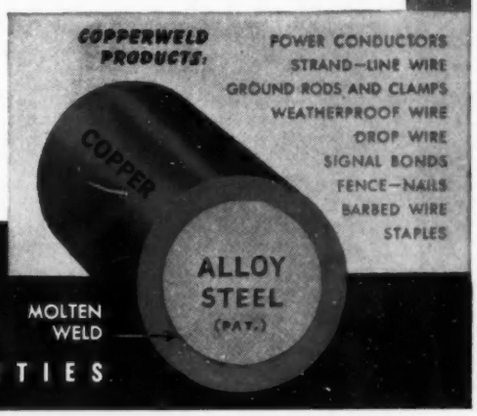
2. The name COPPERWELD is a registered trademark of the Copperweld Steel Company.

3. Only Copperweld Steel Company makes COPPERWELD. Only Copperweld Steel Company, and its distributors, sell Copperweld products to the telephone field—and to manufacturers who fabricate and sell drop wire, weatherproof wire and power conductors.

4. The name COPPERWELD should be used only when referring to copper-covered steel wire made by the Molten-Welding process.

5. The name COPPERWELD should never be used when referring to any other type of copper-covered steel wire—for example—wire having copper merely plated on steel.

All those familiar with the many unique advantages which only Copperweld can offer, will see in these statements our sincere desire to protect every user. When your specifications or purchase orders call for Copperweld, make certain that you get Copperweld quality by actually seeing the name "Copperweld" on the product itself or on the tag accompanying every coil and reel.



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GLASSPORT, PA.
SALES OFFICES IN PRINCIPAL CITIES

U·S·S AMERTEL

Extra strength wire cuts pole needs in half

· You can safely double the distance between poles when you build telephone and telegraph lines with U·S·S Amertel 135 instead of the old standard "B.B." wire.

Amertel 135 has 2½ times the tensile strength and high conductivity as well. Spans can be increased from 150 feet to 350 feet in heavily loaded districts or to 500 feet in lightly loaded districts.

The savings in poles and pole-line equipment, the decrease in construction costs and lowered maintenance costs make Amertel a profitable investment.

The extra strength reduces line breaks from wind and sleet and results in better service. Write for our Bulletin, Amertel 135 giving complete facts. Ask for the details of our PFT Reinforcing Tie.

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It is your assurance of highest quality wire.

We can't manufacture Material

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WE MAY BE SLOW in completing your job

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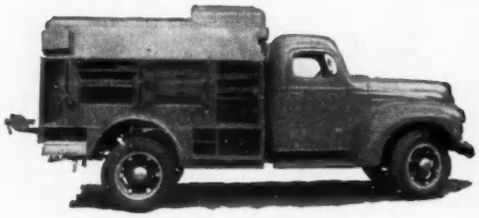

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Light Duty Line Body
Completely Equipped.

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YORK-HOOVER BODIES

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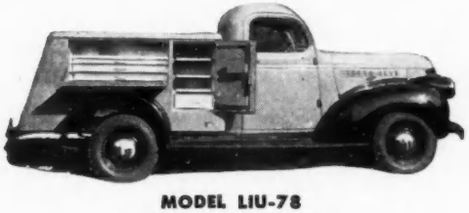
Compact, Practical and Efficient!



MODEL LIU-78
Light Service Body
fully enclosed.

MODEL 4013-AT
Service body with telescoping roof.

COMPACT . . . because all available loading space is profitably utilized.

PRACTICAL . . . because each body principle has been actually proven in the field.

EFFICIENT . . . because there is a place for all necessary tools and materials.

Write for complete information NOW!

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open type.

MODEL 4013-AS
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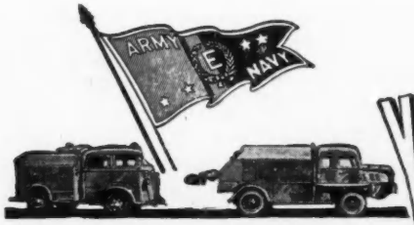
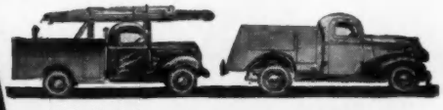
with stationary roof.

MODEL 39
Service Unit with ladder brackets.



BODY DIVISION

YORK-HOOVER CORPORATION



YORK, PENNSYLVANIA

COLOR APPEAL

to the Modern Office

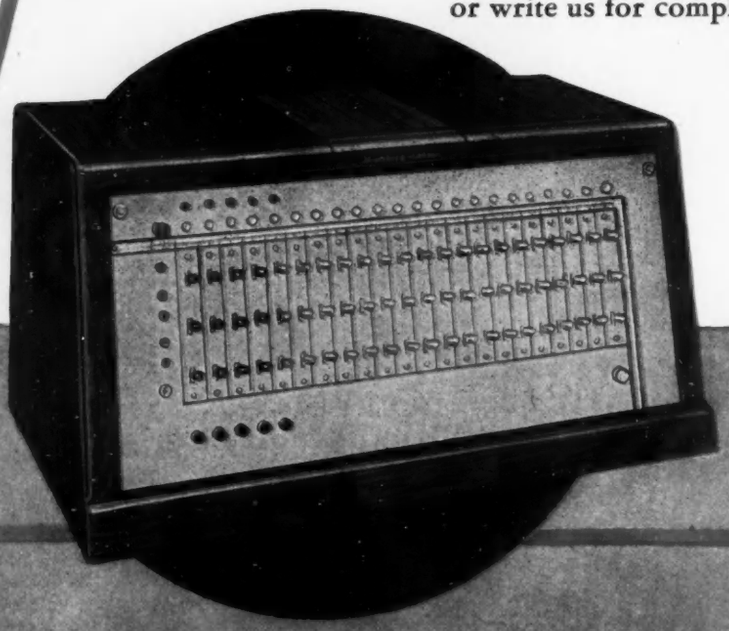
". . . we want P.B.X. Switchboards modern in design."

". . . harmonizing switchboards that will fit in with the modern decorative schemes being used in offices today."

These are the requests being made of operating companies everywhere. Stromberg-Carlson is again happy to say that the No. 120 and No. 121 P.B.X. Switchboards are in production.

These colorful, streamlined Switchboards are the answer to the current demand for something modern. Two-tone genuine walnut cabinet harmonizes with sun tan panels, distinctively colored key handles, and rich brass fittings. They are truly Switchboards in keeping with the most ultra decorative plan.

To find out for yourself how the No. 120 and No. 121 Stromberg-Carlson P.B.X. Switchboards can be helpful to you, consult your Stromberg-Carlson representative, or write us for complete information.



STROMBERG-CARLSON NO. 121 CORDLESS P.B.X. SWITCHBOARD

Wiring and Capacity: 16 lines, 5 trunks, and 5 connecting circuits. Connects with any central energy exchange, either manual or dial. Length: 2′ 2¾″; Height: 1′ 2″; Depth: 1′ 2¾″.

STROMBERG-CARLSON NO. 120
P.B.X. SWITCHBOARD

Wiring and Capacity: 80 lines, 15 cords and 15 trunks. Connects with any central energy exchange, manual or dial, through jack-ended trunks. Height: 3' 9⅝"; Width: 2' 1⅛"; Depth: 2' 8".

STROMBERG Telephone CARLSON

STROMBERG-CARLSON Factory, General Offices: Rochester 3, N.Y.

Branch Offices: Chicago 6, Kansas City 8, San Francisco 3

In Canada: Stromberg-Carlson Company Limited, Toronto

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EDITORIAL

A Matter of Economics

PRICES of telephone equipment and of some classes of telephone materials have gone up. There is nothing surprising about that—or at least there should be nothing surprising. The basis of prices is costs. Costs have gone up. ("And how . . !" said one manufacturer to us recently.)

Prices of telephone equipment and materials may have to go up some more. Nobody knows, for certain, at the time this is written, and the manufacturers hope not, of course. No manufacturer or supplier really likes to raise prices, any more than a telephone management really likes to increase rates. Those are unpleasant duties of the kind we all like to avoid as long as we can.

Present price rises on telephone equipment and materials were based on cost conditions as they were before the coal and rail strikes. Now coal is going to cost more; freight is going to cost more and, as a result, steel and other materials vital in telephone equipment will cost more. So prices cannot yet be considered as fixed or static.

To manufacture telephone equipment and materials of high quality and sturdiness—the kind that requires the least amount of maintenance and repair, and that lasts the longest—will very likely cost more in the future than it has ever cost in the past.

There is something, however, about the situation as to prices on telephone equipment that can easily be overlooked and which, when regarded in its proper perspective, alleviates the situation considerably.

The bulk of the expenditures now being made by telephone companies, and that will be made for a considerable time in the future, is for additional investment in the business; not for expenses. That is, these expenditures are for what the economists call "capital goods" which, in the telephone business, are for such long-lived things as switchboards, telephones, cable, buildings, and so on. And any increased cost of these things is not only spread over a long term of years, but the whole cost is being paid for with money—either already in the company's treasury or obtained from new borrowings or additional capitalization—which now costs less than it has ever before cost in the history of the telephone business.

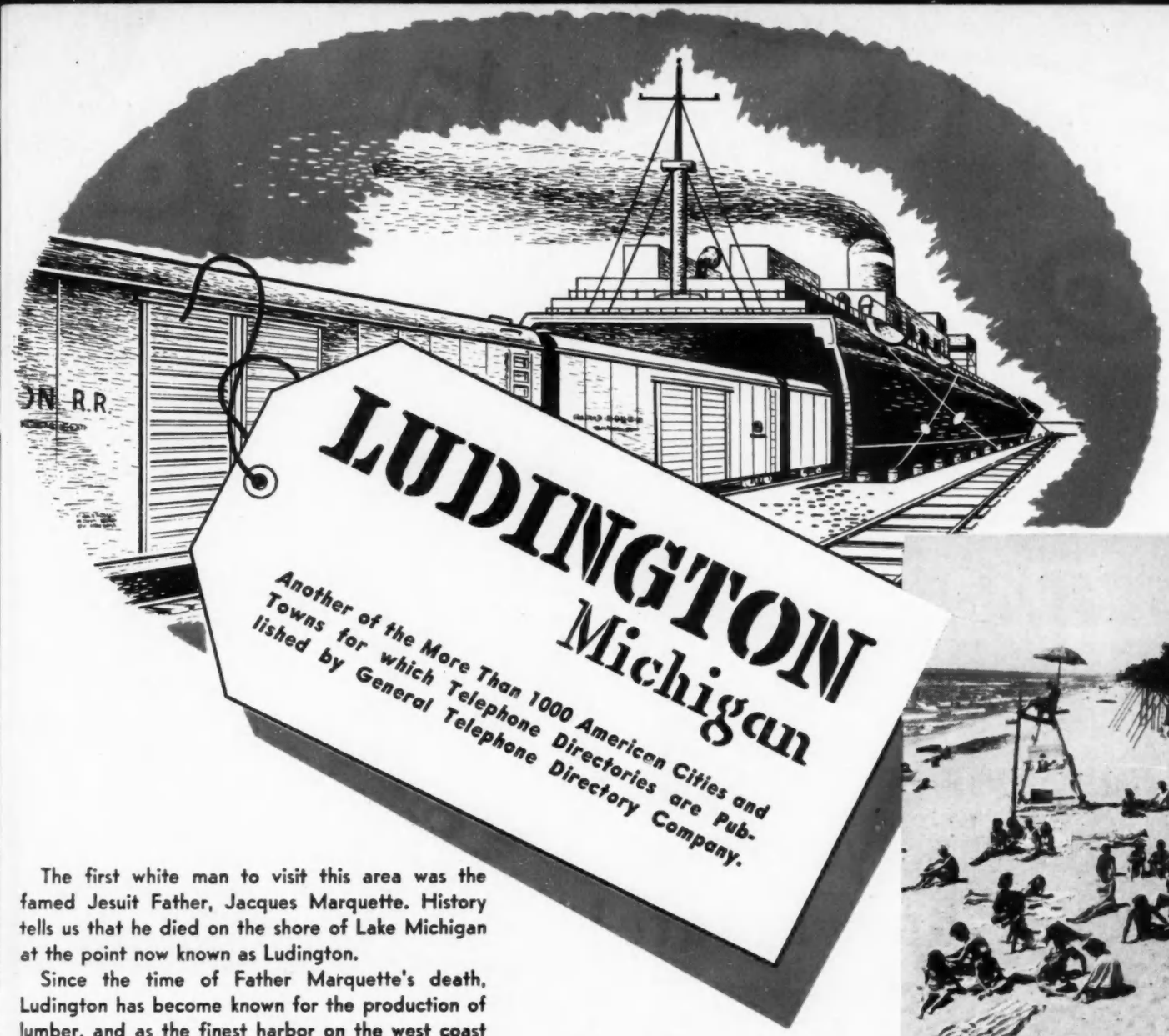
The cost of capital goods for the telephone industry has not risen, and probably will not rise, as much as the cost of money has gone down.

If price was the only consideration, undoubtedly manufacturers could make cheaper equipment for telephone companies. But it would necessarily have to be equipment of lower quality, with a shorter service life, and requiring more maintenance during the whole of its service life. And that, in view of present wage and other maintenance costs, would be about the most expensive equipment a telephone company could buy.

You can't beat Old Man Economics—as some of our Government bureaucrats, who thought wages could be increased heavily with no increase of prices, are now finding out. The economics of the telephone situation are simple. It is the constant, day-by-day expense of maintenance and operation that determines in most cases whether or not the company is prosperous.

Those expenses are now higher than ever before. They may go higher yet. The sturdiest, most dependable and longest-lived telephone equipment and plant it is possible to build is necessary in order to hold those expenses down.

It is to the credit of the telephone industry that it has always sought quality, rather than cheapness, in its equipment. It is to the credit of the manufacturers of the industry that they have always considered quality more important than low price. It is to those attitudes that the industry owes a large measure of its success.


LUDINGTON
Michigan
Another of the More Than 1000 American Cities and Towns for which Telephone Directories are Published by General Telephone Directory Company.

The first white man to visit this area was the famed Jesuit Father, Jacques Marquette. History tells us that he died on the shore of Lake Michigan at the point now known as Ludington.

Since the time of Father Marquette's death, Ludington has become known for the production of lumber, and as the finest harbor on the west coast of Michigan. This harbor, open the year 'round, affords shippers freight service daily across Lake Michigan to Wisconsin. This feature, combined with others equally as favorable, has attracted diversified industry to the area. Among the large organizations making their homes in Ludington is the Pere Marquette carferry fleet which is the largest fleet of ships of that type in the world.

While the normal population is less than 10,000, during the summer months Ludington is nearly double that size. The climate and other natural assets make this area one of the most popular vacation spots in the state.

The Michigan Associated Telephone Company, which serves this community, first employed the complete directory sales and publishing service of our organization in 1937. Since that time the Company has enjoyed steady annual increases in gross advertising revenue from directory operations.

If you contemplate changes or revisions in your present method of directory publication we invite you to send for a free copy of an interesting booklet entitled, "Making More Money from Your Telephone Directory". This informative booklet explains the specialized service offered by our organization - - - a service which relieves your company of all of the time consuming details of publication including the sale of advertising, proof reading, printing, and the preparation of directories for mailing or distribution.

Lawrence A. Buckland, back with General Telephone Directory Company after serving in the Army Intelligence Corps since May, 1942. During his service overseas Capt. Buckland took part in four campaigns: New Guinea, Bismarck Archipelago, Leyte, and Luzon. He was discharged and returned to civilian life in November, 1945.

GENERAL TELEPHONE DIRECTORY COMPANY

Eastern Office: Ben Hur Bldg., Crawfordsville, Indiana. Telephone 2270
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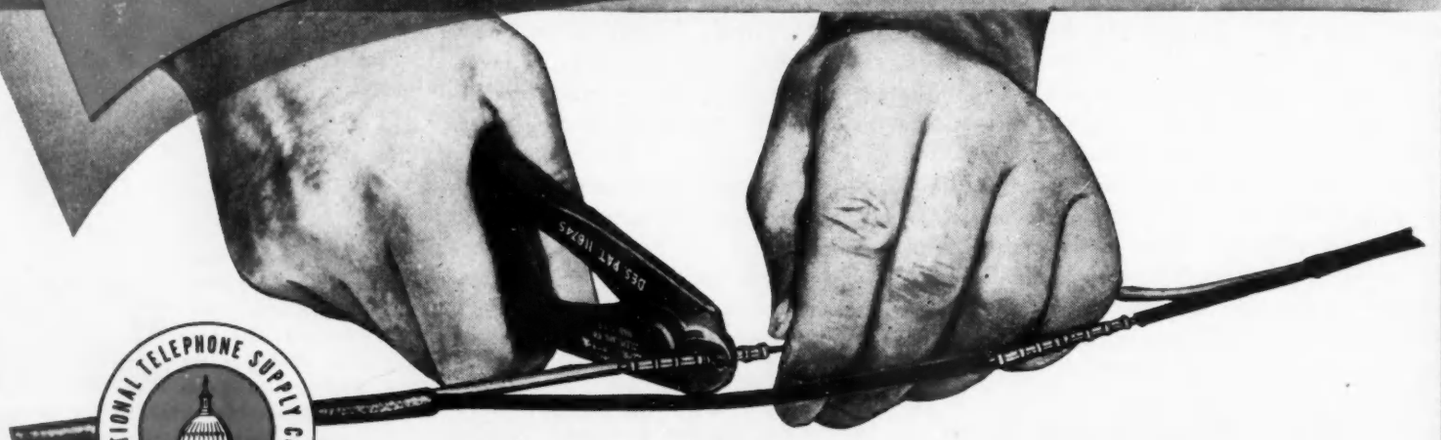
Make better pair splices faster than you've ever made them before!



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The National Telephone Supply Company

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News Briefs...

Howard Leinard Retires

From a $2.00 a week grocery delivery boy to assistant to vice president of the American Telephone and Telegraph Company was the career which ended June 1 with the retirement in Cleveland, O., of Howard O. Leinard, well known figure in the telephone industry.

H. O. Leinard

The first 15 years of his 40 years in telephony were in the Independent field and the last 25 years with Bell.

Mr. Leinard entered telephony in 1906 as timekeeper for the United States Long Distance Telephone Company in Cleveland, O. Subsequent positions were an office job with the Federal Independent Telephone Company, purchasing agent for the United States Telephone Company, purchasing agent for the Cuyahoga Telephone Company, commercial manager and treasurer for the Cuyahoga Telephone Company when it was operated as a separate unit in Cleveland by the Ohio State Telephone Company, general manager and treasurer of the Ohio State company when it operated about 150,000 telephones in 88 exchanges in 44 Ohio towns.

When the Ohio Bell Telephone Company and the Ohio State consolidated on September 21, 1921, Mr. Leinard became Ohio Bell general contract agent and on June 1, 1922, he became assistant to vice president of the American Telephone and Telegraphy Company, with his headquarters in Cleveland.

Now that Mr. Leinard has retired under the Bell System pension plan, he has plenty of time for his hobbies —horseback riding and wood-working. He has a complete electrically-equipped wood-working shop in the basement of his home and won first prize for inlaid wood-working in a hobby exhibit sponsored by the Telephone Pioneers of America in Cleveland several years ago.

Mr. Leinard is a member of the Telephone Pioneers of America and a charter member of the Independent Pioneer Telephone Association. He belongs to Masonic organizations in Cleveland, Akron and Columbus, including the Scottish Rite, 32nd Degree, in Columbus, and the Cleveland Athletic Club.

Right to Operate

The New Rockford-Bush-Sheldon (N.D.) Telephone Company has applied to the North Dakota Public Service Commission for a certificate to operate and maintain a telephone system.

Plant Revision

The Central Telephone Company, Sioux Falls, S. D., has been granted authority by the North Carolina Utilities Commission to drastically revise and construct as outlined its telephone plant at Draper, North Carolina. Upon completion of the reconversion, which is estimated to cost $40,000 and require about 12 months' time, new rates are to be effective. Under the new plan Draper is to become a theoretical exchange receiving direct Leaksville (N. Car.) exchange service, which under the new rates entitles Draper subscribers to an unlimited number of calls to all Leaksville exchange stations, with mileage charges only where established and specified in the authorization.

Independent Honors Its 31 Veterans

The Citizens Independent Telephone Company, Terre Haute, Indiana, held a dinner last month in honor of its thirty-one employees who are veterans of World War II.

Nor were the men who served in World War I forgotten. For after the veterans had been presented with gifts, O. B. Gordon, commercial manager of the company, who served as toastmaster, asked these men to stand and they, like the younger veterans,

(Please turn to page 46)

Returned servicemen and employees of the Citizens Independent Telephone Co., Terre Haute, Ind., honored at the banquet, L. to R.: (bottom row) Stanton Stewart, Ralph M. Clark, Samuel J. Charleck, Joseph S. Isbell, Hugh Whaley, Charles L. Drake, Loren W. Barcus; (top row) Leroy L. Haring, Richard Auginbaugh, Ernest W. Johnson, William A. Lanter, Glenn Orman, Stanley Wilson, Roger B. Withers and Herbert Moss.

Portable

PUMPS AND GENERATORS

By ROY W. CARTER, Electrical Engineer
Cincinnati, Ohio

INCREASING labor costs make power driven tools and equipment almost a necessity in connection with utility construction and maintenance operations. Like other utilities, telephone companies will need to make full use of the modern tools now available or in the design stage. The small, high speed electric motor is capable of amazing performance. It multiplies many times the productive capacity of the ordinary workman. On an annual charge basis of comparison, motor driven tools and equipment are becoming increasingly easy to prove-in over old-fashioned hand methods.

The power source requirements for operating various types of digging, pumping, sawing, etc. tools can be obtained either from a lightweight gasoline driven 110 volt generator, (see Figure 1) or directly from the gas engine itself. The small portable gas engines now available are, like electric motors, capable of producing a surprising amount of power in spite of their light weight. This is accomplished by operating them at relatively high speeds.

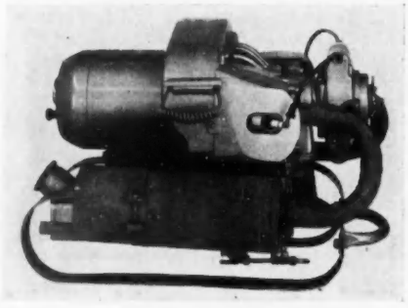
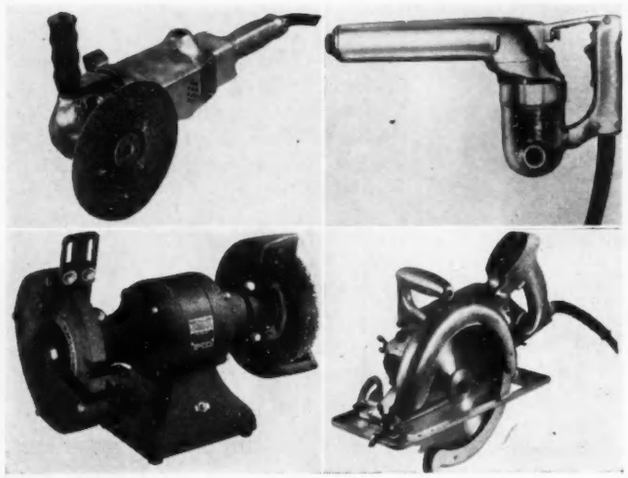


Fig. 1—Well designed portable a-c power plant suitable for telephone company use. (Courtesy Homelite Corporation)



A few of the many motor driven tools that can be used with portable power plants. From L to R, top to bottom are Black & Decker's popular sander, sturdy hammer, handy bench grinder and powerful quick saw.

Operation of tools by means of electric power, has some advantages over gas engines with respect to flexibility as it permits the power driven tools to be relatively small and light and it offers greater flexibility with respect to the number and kind of tool applications that can be worked out. But for certain specific applications, such as pumping water from manholes, the directly operated gasoline engine driven pump will usually be found preferable.

Field of Use of Portable Power Plants

The portable gas engine driven generator has a definite place in connection with construction and maintenance activities in the telephone field. In general, any operation that can be done with a motor driven tool will save time and show economy over hand methods, particularly if the operation is tedious and time consuming. Such operations as pole framing, hole drilling and sharpening tools, are typical of operations that can be speeded up if motor driven tools are used. A few typical motor driven tools

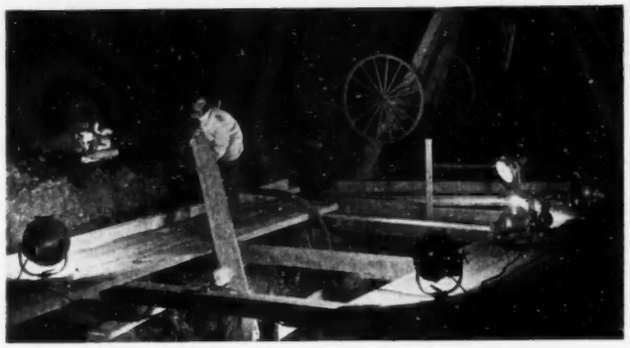


Fig. 3—Use of power plants to supply emergency lighting for night repairs. Here a Homelite pump is dewatering an excavation.

are shown in Figure 2.

If you are interested in prices and booklets on any of the motor driven tools, please drop a postcard to the New Products editor, Telephone Engineer Publ. Corp., 7720 Sheridan Rd., Chicago 26, Ill., and all available literature will be sent you promptly. Added information on any of the current Homelite pumps and generators will be included if you indicate it on your postcard.

The more common applications are: (1) in operation of flood lights for emergency line repair work at night (see Figure 3), (2) furnishing power for the central office during a power outage, (3) operation of motor driven manhole blowers, (4) furnishing power for drills and saws used in pole framing and stepping operations, (5) operations of motor driven electric tamping tools, (6) use of motors on rewinding reels on small trucks, (7) furnishing power for truck mounted tool grinders, (8) furnishing power for small electric winches, and (9) operation of electric heaters used in covered construction trucks during winter storm emergencies. Figure 4 shows the use of a portable power plant for a manhole cover drilling job.

If the need is indicated, it can be expected that manufacturers will be quick to produce new motor driven tools designed especially for telephone construction work. For example, simple light weight motor driven tree trimmers woul l speed up this time consuming operation and reduce the drudgery with present day tools.

The portable engine driven power source can be arranged for running board mounting (larger trucks), or within the truck. It should be wired to conveniently located power outlet plugs on both sides of the truck, and so arranged that it can readily be disconnected and removed for use in locations which cannot conveniently be reached with the power cordage available or for situations where the unit is to be left on the job.

Fig. 4—Special application of portable power plant for drilling manhole covers.

Photos courtesy Homelite Corp.

Power Requirements

If the generator is to be used only for minor applications such as a few lights, a small electric drill or an electric hammer, of the smaller unit type, such as the 1,800 watt size, weighing only 115 pounds, should be used. But for general purpose use, particularly by the larger exchanges, the 2,500 watt size will be found best adapted for telephone construction and maintenance truck purposes. This unit weighs 135 pounds. When electric hole diggers are used it is particularly desirable to use the 2,500 watt unit.

It is essential that the power cord used be of adequate current capacity to prevent an excessive voltage drop. Table No. 1 should be followed in selecting a power cable for various loads.

Special Portable Charging Generators

Modern power networks are reliable and give long service without interruption but they do occasionally fail. These failures often occur during emergency periods, as for example, floods, hurricanes, blizzards, etc. It is at such times that telephone service is most vital to a community. The capacity of the battery in a common battery exchange is seldom adequate to furnish power more than a day or so without charging, particularly under the heavy load conditions that usually prevail during an emergency situation.

Special gas engine driven generators designed especially for central office battery charging are now available (see Figure 5). They are extremely light in weight and can quickly be pressed into service for charging the central office battery.

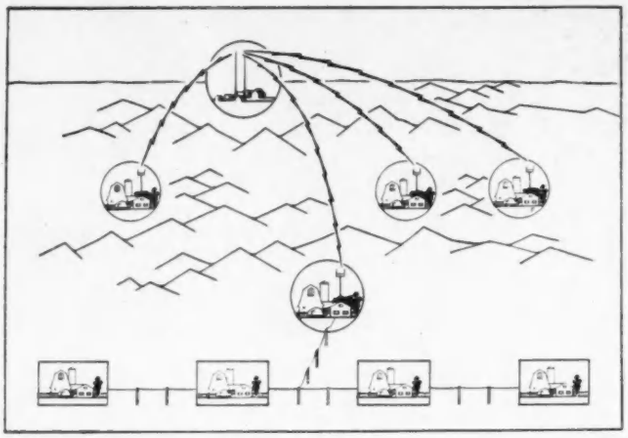
These units are available in various capacities and voltages. Models are available which will take care of 61 to 70 cell batteries whose voltage range extends

(Please turn to page 66)

Table 1—Cable Size Required for Transmission of 120 Volt Current

The smallest size two-wire cable which will transmit the current with a voltage drop of less than 5-volts is listed for various loads and distances.

Load	DISTANCE (FEET)									
(Watts)	50	100	150	200	250	300	350	400	450	500
250	16	16	16	16	16	14	14	14	14	12
500	16	16	14	14	14	12	12	10	10	10
1000	16	14	12	10	10	8	8	8	6	6
1500	14	14	10	8	8	8	6	6	6	4
2000	14	10	8	8	6	6	6	4	4	4
2500	14	10	8	6	6	4	4	4	—	—
3000	12	8	8	6	4	4	4	4	—	—
4000	10	8	6	4	4	4	—	—	—	—
5000	10	6	4	4	4	—	—	—	—	—



Sketch shows the relative location of the eight ranches participating in the trial of radiotelephone service in Colorado. Radio transmitter and receiver equipment will be located at the telephone central office in Cheyenne Wells (represented by top circle), where it will connect with the regular telephone system. Four of the ranches (in circles) will be served by direct radio links to the telephone central office. The other four (in squares) will be reached by comparatively short open wire lines extending from one of the nearby ranches having radiotelephone equipment, through which they will be connected with the central office.

RADIOTELEPHONE SERVICE TRIALS

in Colorado and Missouri

THE practicability of furnishing rural telephone service by radio will be tested under actual operating conditions this summer in the vicinity of Cheyenne Wells, Colorado.

Establishment of the necessary radio facilities at Cheyenne Wells and at the ranches involved in the test has been granted by the Federal Communications Commission to the Mountain States Telephone and Telegraph Company, serving that section. Installation of the system is to be started at once. The equipment has been developed by the Bell Telephone Laboratories, which will participate in the trial. The development may be of far-reaching significance to families who desire telephone service but who live in remote and sparsely-settled areas well beyond reach of telephone and power lines.

Cheyenne Wells, center of the area selected for the experiment, is in eastern Colorado, near the Kansas border. The eight ranch families who will participate in the trial live in widely-separated locations 11 to 21 miles from the town and are not reached by either telephone or power lines. The power needed to operate the subscribers' radio equipment will be obtained from their home electric plants.

Four of the ranches will be served by direct radio links to the telephone central office in Cheyenne Wells. The other four will be reached by comparatively short wire lines extending from one of the nearby ranches having radiotelephone equipment, through which they will be connected with the central office. By means of this radio and wire combination the telephones at the ranches will be joined to form an eight-station "party-line" terminating at the Cheyenne Wells switchboard in much the same manner as conventional rural lines.

Radiotelephone equipment at each of the four ranches will include a receiver, a transmitter, a telephone and two antennas. The transmitter, having power of about ten watts, and the receiver will be enclosed in a steel cabinet which can be located out of sight, with only the telephone instrument in view. The antennas will be mounted on a pole or atop one of the ranch buildings.

At the central office in Cheyenne Wells there will be transmitter and receiver equipment and apparatus required to connect it into the regular telephone system. The equipment will operate on frequencies between 44 and 50 megacycles.

To make a call, a subscriber will move a switch-key on his telephone, causing a radio signal to be transmitted to the operator. In all other respects the subscriber will use the service in the normal manner. The operator will handle the call substantially the same as she does any other.

In order to gain experience without delay, the trial is being conducted with modified apparatus originally designed for other purposes. It is expected that the operating experience gained in Colorado will aid the Bell Telephone Laboratories in developing a standard rural radiotelephone system especially designed to meet the requirements of this type of service.

Another step in radiotelephone progress is that operators of motor vehicles in St. Louis, Missouri are about to obtain two-way telephone service between their cars or trucks and regular telephones connected to Bell lines.

The first license to operate radiotelephone service for vehicles has been granted to the Southwestern Bell Telephone Company by the Federal Communications Commission. The service will be introduced in St. Louis at once and will be provided initially on an experimental basis but under regular commercial conditions.

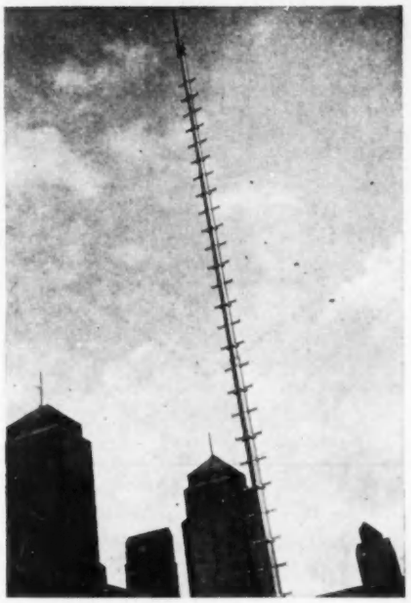
Three classes of service will be offered: (1) a general two-way telephone service between any vehicle and any regular telephone or other mobile unit; (2) a two-way dispatch service between a customer's office and his own mobile units only; and (3) a one-way signaling service to mobile units to notify the driver that he should comply with pre-arranged instructions.

The rates for a three-minute general service message within the area served by the St. Louis radiotelephone station range from 30 to 40 cents depending on the location of the land telephone. The charge for a one minute two-way dispatch call is 15 cents. The rates for most calls will not vary with the location of the vehicle. If the calling or called land telephone is outside the St. Louis mobile service area, toll rates apply.

The radio equipment on the vehicle may be provided either by the customer or the telephone company. If furnished by the company, the monthly service charge is $15 and an installation charge of $25 applies.

The general mobile radiotelephone service will operate like this:

Calls to and from vehicles will be handled by mobile service operators. The conversations will travel part way by telephone wire and part way by radio. For example, a man at his desk in St. Louis who wants to talk to the occupant of a certain car or truck will lift his telephone receiver and dial or ask for long distance. He will then ask for the mobile service operator, to whom he will give the telephone number of the vehicle. Numbers such as WJ 2-3873, which will not conflict with any existing central office code, will be used.



Transmitter mast of radiotelephone station, W9XAY, atop the headquarters building of the Southwestern Bell Telephone Co.

The operator will send over the channel a signal which selects the particular mobile station desired and causes a bell to ring and a light to go on in the car or truck. When the driver sees or hears his signal he will answer his telephone. His voice will travel by radio to the nearest receiving station and thence by telephone wire back to the caller.

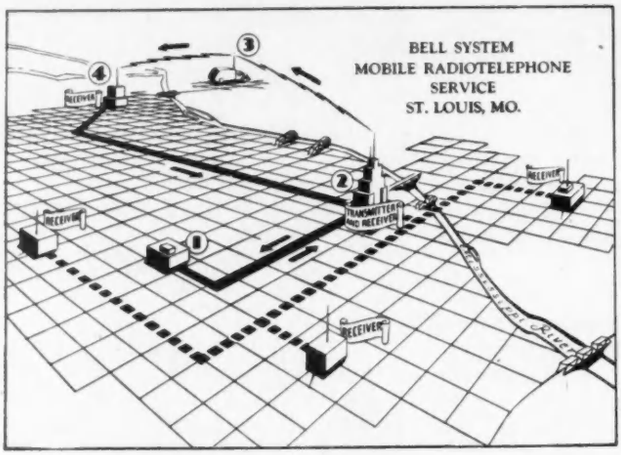
The person in the vehicle will be able to make a call merely by lifting his telephone and pressing a "talk" button to signal the operator.

Equipment to be installed in the cars and trucks consists of a radio receiver and transmitter, antenna, selective signaling device, and telephone instrument. The instrument, which will be similar to a regular hand telephone, will be mounted on or under the dashboard, within easy reach of the occupant. The transmitting and receiving units, having power of about 20 watts, will be located in the trunk of a car or in any suitable place on a truck. Each of the two units will be contained in a steel case approximately 10″ wide, 18″ long and 8″ deep, and each will weigh about 40 pounds. The single antenna for both sending and receiving will be approximately 18″ in length, mounted on top of the vehicle.

The radiotelephone central office equipment employed in St. Louis includes a transmitting station and five receiving stations. The antenna of the 250-watt transmitter is located on a 50-foot mast atop the Southwestern Bell headquarters building at 1010 Pine street. The receiving stations are located in various sections of the

View of the handy slide-out type telephone set used in connection with mobile radiotelephone equipment. The set fits under the dashboard of the vehicle, within easy reach of front seat occupants.

Participants in the trial are expected to include such concerns as parcel delivery and express companies, newspaper publishers, power companies, contractors, bus, trucking and moving van concerns as well as oil burner, refrigeration and other servicing organizations which operate vehicles within the area and to whom keeping in touch with their drivers is important.



How calls are handled by mobile radiotelephone service. Telephone customer (1) dials "Long Distance" and asks to be connected with the mobile service operator, who sends out a signal from the radio control terminal (2) which causes a lamp to light and a bell to ring in the mobile unit (3). Occupant answers his telephone, his voice traveling by radio to the nearest receiver (4) and thence by telephone wire.

city so that vehicles with their relatively low-powered radio sets will be within range at all times. The receiver nearest a calling mobile unit will pick up the voice signals and send them on their way by telephone wire. Radio channels within the frequency range of 152-162 megacycles have been assigned for the service.

St. Louis is the first of the cities in which the Bell System plans to inaugurate mobile radiotelephone service this year. Authorization to establish experimental radiotelephone stations in other cities has been the installation of required equipment at those points. Application for a license in each locality must await completion of the necessary facilities.

The cities in which the construction of stations have been authorized to date include Boston, Springfield, Providence, New York, Newark, Philadelphia, Baltimore, Washington, Pittsburgh, Miami, Atlanta, Minneapolis, Green Bay, Milwaukee, Chicago, Detroit, Toledo, Cleveland, Dayton, Columbus, Cincinnati, Louisville, Indianapolis, Memphis, Kansas City, granted and work is progressing on Birmingham, New Orleans, Fort Worth, Dallas, Houston, Oklahoma City, Denver, Salt Lake City, San Francisco and Seattle.

Applications for authorization to construct radiotelephone stations in Worcester, Richmond, Akron, Los Angeles and Portland, Ore., are now pending before the Commission. Surveys to determine the desirability of extending the service to other cities are also underway.

Bell System plans for mobile radiotelephone service to cover certain intercity highways were announced last December. Applications for authorization to construct transmitter-receivers along the highway between New York and Boston and between Chicago and St. Louis are pending. Other applications are in preparation for radiotelephone stations along the New York-Albany-Buffalo route. To date, construction permits have been granted for highway stations at Boston, Providence, Cincinnati and Green Bay, Wis.

When established, the highway stations will permit communication between vehicles traveling along the routes and any wire telephone. A number of companies, including truck and bus lines, long distance movers, utilities and other organizations have indicated interest in highway radiotelephone service and a desire to participate in experimental trials.

DO YOU KNOW

The U. S. Armed Services have trained more than 500,000 radar and radio technicians, operators and repairmen.

✦

Telephone calls between the United States and Alaska pass over Bell System lines to Seattle, Wash., and then over radio-telephone channels of the Alaska Communications System, a branch of the U. S. Army Signal Corps.

✦

What's Happening to Our Telephone Poles?

With the scarcity of conventional home building materials, it looks like people are borrowing from our telephone pole supply. The Kroschel family of St. Paul, Minn. needed a house. Building materials and labor were scarce. But the Kroschels wanted a house, so-o-o Ray Kroschel built it of telephone poles.

Acme

Patricia, youngest of the Kroschels, inspects their new house of telephone poles.

Of all places, Okinawa during the fighting there, scarcely seemed the right setting for a radiotelephone conversation beginning with "Hello, is that you, Cutie?" But Cutie was the telephone code name for a fighter squadron.

✦

The most phoneless country in the world is British India with one for every 5,000 persons.

✦

There are more than 49,000,000 telephones ("complicated ear-trumpets"—1880 diction) in use today.

✦

Makes 10,000-Mile Speech

From a telephone in New York Alfred E. Daff, of Universal International Films, Inc., addressed a convention in Sydney, Australia—more than 10,500 miles away It was the first speech ever broadcast by loud-speaker after transmittal half way around the world by telephone. The speech was transmitted by the Bell System over its wire lines to San Francisco and then by radio-telephone channel across the Pacific Ocean.

IMPEDANCE MEASUREMENTS

Without an Impedance Bridge

IN the telephone field it is occasionally necessary to measure the impedance of an inductance and a ringer or some other piece of telephone equipment. The impedance is of course materially different than the direct current resistance and takes into account the size of the wire, the number of turns, type of core, as well as the frequency employed in the measurement. Impedance measurements normally require the use of an *impedance bridge.* This type of instrument is seldom found in the Independent plant; however, by means of a unique measuring arrangement, simple impedance measurements can be made which are reasonably close for most purposes.

Figure 1 illustrates how impedance of a telephone ringer can be measured by this *substitution method.* If impedance at 1000 cycles is desired, the ringer under measurement is connected in series with a resistance which is variable over a range of from 100 to 100,000 ohms. An a-c voltmeter of the high impedance type is then connected first across the variable resistance and then across the ringer. The variable resistance is adjusted until both readings are the same. The approximate value of the ringer impedance at 1000 cycles can then be determined by simply measuring the d-c resistance cut into the test circuit using for this purpose an ohmmeter or Wheatstone bridge.

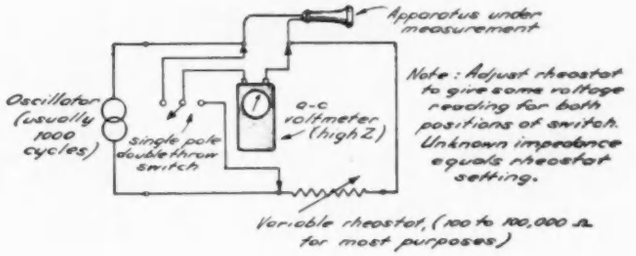

Apparatus under measurement
Note: Adjust rheostat to give same voltage reading for both positions of switch. Unknown impedance equals rheostat setting.
Oscillator (usually 1000 cycles)
single pole double throw switch
a-c voltmeter (high Z)
Variable rheostat, (100 to 100,000 Ω for most purposes)

Fig. 1—Measurement of impedance of telephone apparatus.

NEW BUSINESS *Surveys*

FOR several years telephone companies have been able to take care of only a small percentage of the total offered business because of material and instrument shortages. As a result there has been a tendency to forget that the commercial department of a telephone company must be constantly on the alert for new business and new ways to sell telephone service. The commercial department of one aggressive telephone company, anticipating that the time is fast approaching when we will be back in a buyers' market, is already busy looking for new business.

This company has launched a continuing campaign for new business by making a complete business survey of its entire operating area. The survey consisted of commercial representatives contacting the principal business houses in each community and expressing interest in the company's future activities and plans. These contacts were well received by the business firms and resulted in a substantial amount of valuable information.

Information on building expansion, new lines to be handled, establishment of new agencies, and plans for improving the business efficiency of an organization was obtained. This was all helpful as a clue to immediate and future sales of telephone service. The proposed plans of the various business organizations in each exchange area were converted into an estimated demand for telephone service and new prospects for PBX equipment. The information gained was summarized on special sheets for each of the telephone operating districts and will be used as their guide in soliciting new business. Ninety-three concerns in four districts were contacted uncovering 140 new projects involving a total of 1,220 new employees with a potential demand for 398 telephones and 26 PBX systems. This is business worth going after. The manner in which the information was summarized is shown below. The survey was directed by Merle Hale, general commercial superintendent of the Lincoln Telephone and Telegraph Company of Lincoln, Nebraska. The campaign was specifically designed to: (1) anticipate new business and be ready to sell and service it, and (2) stimulate sales representatives to be on the alert for new business after several years of inactivity due to having little or nothing to sell.

Summary of Business Expansion Plans

Name of Business	Nature of Business	Postwar Plan	Additional Permanent Employees
Smith Buick Co.	Automobile Agency	Expect to lease three additional buildings to house three new departments — Truck Dept., Auto Agency, and General Elec. Products.	115
Jones Grocery Co.	Wholesale Grocer	May build new building. Possibility of returning to their old location.	10
Alpha Hardware Co.	Wholesale Hdw.	Will build new building east of present quarters. Construction date indefinite.	15
Star Auto. Co.	Automobile Agency	Has purchased property between 1st and 2nd on B. St., for business expansion.	40
Oneega Steel Works	Mfg. Plant	Will build one new building and an additional warehouse.	25

NOTE: Names given in sample summary sheet are merely illustrative.

Conducted by the
Observer and his Gang

THE Observation Tower

If you have observations or even a friendly bit of argument suitable for use in this column, you are invited to send them along, which automatically makes you a member of the Gang. You will be anonymous—no names of telephone people or telephone companies are used in this column. Address "The Observer," in care of TELEPHONE ENGINEER AND MANAGEMENT.

Do You Like Puzzles?

Gangster No. 173 says that every time the power company in his territory gets out another one of those ingenious stuffers with its bills, showing how much rates for electricity have been reduced during the past fifteen years or so, a number of his subscribers want to know why telephone exchange rates haven't gone down likewise during the period.

Some of them are always certain to point out, he says, that the number of telephones at the exchange has increased considerably during the period—therefore why shouldn't the rate per telephone be decreased accordingly?

This Gangster says he wishes somebody would get up some graphic and easily understandable illustration, chart or other document of some kind that would show anybody who looked at it just why it is that telephone exchange rates must be higher at a large exchange than at a small one, and why rates per telephone must be increased as the number of telephones served at the exchange increases.

We have seen a recent advertisement by one of the large telephone companies which is a very graphic illustration of the facts of life about telephone exchange rates. It is headed, "Do You Like Puzzles?" and has three illustrations, each numbered and explained.

The first illustration shows three telephones, interconnected, with a total of three circuits connecting them. The second illustration shows six telephones interconnected, and also shows that fifteen pairs of wires are required to interconnect the six.

The third illustration shows twelve telephones, with the number of pairs of wires necessary to interconnect all of the twelve—and invites the reader to figure out, from the diagram, how many pairs are needed for that job.

"When you get the answer," says the ad, "you'll notice that as the number of telephones goes up, the network to connect them becomes vastly more complex. Imagine the connections required for 1,200 telephones, or 12,000 telephones—."

All of which reminds us of a story told us some time ago by a Gang Member, about some of his early days in the telephone business. It seems that he was struggling to keep a few laps ahead of the Sheriff at a small telephone exchange which had a number of farm subscribers which the company was trying to serve, with company-owned telephones, at $1.25 a month.

The farmers got the idea that this rate was too high, so they held a mass meeting about it. They wanted to be fair with the telephone company, however, so they came out of the meeting with a proposition to the company that if it would cut its farm rate in half, they would personally canvass the territory and would guarantee to get the company twice as many farm subscribers!

Hail to a New Idea!

Gang Member No. 191 wants us to give a pat on the back—which we hereby do, with palms—to the Indiana Telephone Association for pulling what it termed a "Service Conference" at its recent annual convention in early May. A committee of the association fixed up a series of short talks to be made, at the opening of the convention, by six people representing, respectively, the urban citizen, the rural citizen, the regulatory official, the telephone chief operator, telephone plant man and the telephone management.

The urban citizen was represented by a gentleman who characterized himself as a country lawyer; the rural citizen by a farmer who is president of the state Farm Bureau; the regulatory official by a member of the staff of the state commission. The telephone people were, of course, from telephone companies in the state.

We don't know just how much the non-telephone speakers on this program "pulled their punches" and talked nicely about the telephone fraternity; we hope they said really what they thought. It's a good idea to know just what your customers and others with whom you deal do

really think about you, and it will be a helpful thing to know if the business or industry that is criticized will take the criticism in good part and get at the job of correcting —when that is possible in today's topsy-turvey world— the things that are wrong.

It takes some courage to lay yourself open, and publicly, to the ideas of the other fellow as to what you should do. Most of us prefer to think and talk about the good things we are doing and how well we are doing them, rather than to discourse on the things we could do and are failing to do. But the things we really need the most to know about our performance are the bad things—the things that need correction.

Someday, maybe, some bold, adventurous telephone management will start out to learn about all the complaints there are in the telephone business, or its particular part of it. They'll go out and actually fish for criticism, and you can be sure that they'll get an earful. But you can be certain that if they use that information right, they'll improve their business and its public relations to such an extent that the results will seem to be a miracle.

We think the Indiana Association—which is known far and wide as a progressive and forward-looking institution —should have the thanks of the telephone fraternity for at least starting the ball rolling.

It might be a good idea to organize a bunch of telephone complaint hunters who would be willing to go out and learn just what the public really does think about telephone people and their way of running the telephone business. They'd need to be good-natured guys, not easily embarrassed, not argumentative, and with enough imagination to find a way of turning complaints into betterments of telephone service and public relations. They might turn up some things of great value to the telephone industry. Who knows?

"Flowers, candy, shows, nylons, what I want is a telephone!"

Telephone Rates Plus Taxes

A friend of ours, who recently returned from a long motor trip, jumped down our throat the other day about what he called high telephone toll rates. Seems that he had the habit of calling ahead some distance, every day, to line up a place to sleep that night; and when he had to put his hand in his pocket after every call, the amount seemed to him to be unduly high.

We were a bit puzzled at first, since we know this fellow well enough to know that he never does much groaning about the cost of his telephone, or his long distance calls, when he is at home. We finally figured it out the difference was that when at home, he paid his telephone bills by check and presumably never took the trouble to calculate the cost of each individual call. But when out on the highway, he had to dig up the charges in cash—and that made him, so to speak, rate conscious.

We then found out, after a bit of conversation, that this particular American was dumb, deaf and blind to the fact that our genial Uncle Sam was nicking him substantially, by the way of excise taxes, on every telephone toll call. So we did a little calculating for him on all of the long distance charges that he could remember, and showed him just how much of the money he dug up each time went for taxes. We showed him that only the remainder of the sum went to the telephone company to pay for his call.

Well, he thought a lot better of telephone companies after that, and now he's looking for somebody he can complain to about the high cost of taxes on telephone calls.

It strikes us that, regardless of how careful the telephone companies are always to separate, on monthly bills or at the time of collecting for a call, the amount that is for the call and the amount that is for taxes, there are probably a lot of people who never get the distinction mentally clear. It's the old story of the fellow who happens to have to collect the taxes being blamed for the total price.

We don't know of anything the telephone companies can do about this situation, while it lasts, excepting to make it as clear as possible, when billing or collecting from the customer, how much of the total bill is for taxes and not for telephone service. Many—perhaps most—telephone companies are doing about all they can in that direction now, being careful even to separate the amout for the call, and the amount there will be for taxes, when quoting a rate to an inquirer.

Of course the best cure for the situation is to get the excise taxes on telephones and telephone calls reduced to a more reasonable level—with the hope and prayer that some day these taxes will be taken off of telephone service altogether.

It is reported that Congress will write a new tax law next year and may possibly make some changes in the present tax law this year, probably effective at the beginning of next year. No doubt the telephone industry will be there, at the time Congress goes to work on the matter, to tell its troubles to the gentlemen on Capitol Hill.

About The Terrible Shape We're All In

We think that maybe there's a moral in the following little skit, which we have lifted bodily from that interesting little monthly, *Industrial News Review*--which admits to having gotten it from the *Lincoln* (Neb.) *State Journal*:

The dinner started with cream of tomato soup. The main course was a giant rib roast, with mashed potatoes and broccoli. Soft rolls of white flour were served, with two patties of butter to a plate. Dessert was apple pie with ice cream. There was coffee with cream and sugar. The speaker cleared his throat, "We are a bankrupt nation . . ." he began.

Roland C. Davies
Editor
Telecommunications Reports

Our WASHINGTON *BUREAU Reports*

By
ROLAND C. DAVIES
and FRED HENCK

THE principle of separate treatment of public utilities by government agencies entrusted with the job of smoothing the path of labor negotiations received its first Congressional endorsement with the passage of the Case bill, but there was no indication as TELEPHONE ENGINEER & MANAGEMENT went to press whether President Truman would sign the measure or veto it.

The Senate, in approving the Case measure by a virtual two-thirds majority of those voting, included in it a section establishing permission for the President to set up emergency fact-finding commissions to work on any labor dispute concerning utilities with fixed rates—including, of course, the telephone operating industry—if the Federal Mediation Board, inaugurated in the bill, is unable to effect a solution.

It was indicated in some quarters that Mr. Truman, now that public resentment against strikes has abated somewhat with the settlement of the rail and coal walkouts, would veto the bill. If he does, it is unlikely that the necessary two-thirds vote to enact the measure into law over his veto could be summoned. But another strong possibility was that he would take no action on the measure before the expiration of the required 10-day deadline on June 12, thus permitting the Case bill to enter the statute books automatically.

Passage of the utilities section was, however, a strong indication of changed thinking in Congress on the subject of separate machinery to combat stoppages in essential public services. Little more than two months ago, Senator Joseph Ball (R. Minn.), the Senate's strongest proponent of such legislation, told TELEPHONE ENGINEER flatly he saw no possibility of the passage of such a measure. But the coal and railroad stoppages altered Congressional thinking on the subject radically.

The Case bill section providing for the setting up of the fact-finding bodies, if enacted into law, might have little effect on any labor disputes within the Independent telephone industry. Because of its requirement of Presidential intervention, through the appointment of a commission to deal with each separate strike threat, it was felt that in practice such action might be limited, in the telephone industry, to any projected nation-wide stoppage in the Bell system. But the possibility of Presidential action is definitely there, through the provision that the Chief Executive at any time could set up a commission to deal with work stoppages in fixed-rate utilities after the Federal Mediation Board failed to bring about an agreement.

The section provides a cooling-off period in utilities walkouts of up to 95 days. This would be implemented through the 30-day strike notice period, a maximum of 30 days in which the commission is to file its report, a 30-day extension of the report deadline, and five days after the report is filed during which the workers are to continue their duties. The commission could, of course, file its findings in less than 30 days if it cared to.

NFTW Looks Toward Independents

The Independent industry, already involved in several strike threats in recent months, may soon have to consider labor as a more important problem than heretofore. That possibility is quite evident in the moves of the National Federation of Telephone Workers, holding its national assembly in Galveston, Texas, early this month, looking toward increased organization of the employees of Independent companies.

The NFTW—which generally has

Members of the Citizens Independent Telephone Co., Terre Haute, Ind., banqueting at the Terre Haute House and honoring their 31 employees who served in World War II.

a far more enlightened and cooperative policy than a great many labor organizations—realizes that it is difficult and costly to enroll the workers of small Independents. But it is gearing its thinking toward enrolling the employees of the larger Independent groups of companies on a system-wide basis. That is its thinking with regard to the Bell System, and there is evidence that it is being transferred to the Independents.

The plans of the telephone union, one of the fastest-growing of labor organizations, also are highlighted by the "One National Union" proposal. This would involve a name change to "The American Communications Union," and would embrace the workers of the entire communications industry — telephone, telegraph, and international cable and radiotelegraph. It would do away with the present loose autonomy of the various federations, and provide the union with a stronger central headquarters.

The "One National Union" proposal was to come near the top of the national assembly's agenda. In sharp contrast with the dictatorial acts of other union chieftains, however, was the required procedure which the NFTW must go through to adopt it. First, it was to be considered at the assembly by representatives of all the federations. Then, if approved, it will be submitted to the entire membership for a referendum vote. If okayed by a majority of the telephone union members, it then will have its final action at a constitutional convention scheduled for October.

Gwynne Bill

One bright spot on Capitol Hill in recent weeks has been the favorable action taken on two important administrative-legal measures. First was the Gwynne Act, which sets up a two-year statute of limitations on employee damage suits brought under the Wage-Hour Act. Formerly, employers frequently found themselves with retroactive double damage suits for alleged wage-hour violations, when after complying with the Act's provisions they were left holding the bag by changes in administrative policy or procedure. The revisions were then applied to their past performance. Now, under the Gwynne Act, civil suits must be brought within two years after the date of the charged violation.

The Gwynne Bill has been passed by the House and reported favorably by the Senate Judiciary Committee with one minor amendment.

At the same time, the McCarran bill, which measure makes mandatory certain administrative practices of Federal regulatory agencies—generally already practiced by the FCC—such as giving notice to all interested parties and holding hearings was signed by the President early this month and is now law. It also "spells out" the point at which a party aggrieved by a regulatory agency's findings may appeal to the courts. Heretofore, persons going to the courts have occasionally been told that they had not exhausted their administrative remedies within the agency, and that the court thus had no jurisdiction.

TELEPHONE ENGINEER C. H. Biscardi

"Joe's been seeing some of those Dr. Kildare movies again!"

Signal Association Being Formed

With two Independent operating company executives on its interim Board of Directors, the proposed Army Signal Association is receiving an excellent response from World War II's commissioned and enlisted personnel, and from the communications manufacturing and operating industries. The interim officers of the Association have been selected by Major General H. C. Ingles, Army Chief Signal Officer, to serve until the Association holds its organizational meeting, probably in the late summer or early fall, to adopt and amend the interim constitution.

Col. William C. Henry, president of the USITA and of the Northern Ohio Telephone Co., is an interim director, along with Theodore S. Gary, vice president of Theodore Gary & Co. and of the Automatic Electric Co. The Board includes Paul Galvin, president of the Galvin Manufacturing Co., Col. George P. Dixon, of I.T.&T., Brigadier General Carrol O. Bickelhaupt, A.T.&T. vice president and secretary, and others who were instrumental in the wartime operation of the Signal Corps. RCA President David Sarnoff is interim Association chief executive. Interim vice presidents are William J. Halligan, president of Hallicrafters Co. in Chicago, Darryl Zanuck of Twentieth Century-Fox Films, and Fred Friendly, former Signal Corps master sergeant.

The aim of the Association is "to promote mutual understanding and to effect cooperation with the National Guard, Reserve, Regular Army personnel, American scientists, inventors and engineers, and the communications, motion picture, and photographic industries, both operating and manufacturing."

Independents to Participate In Bus Test Case

The U. S. Independent Telephone Association was scheduled to participate in the important highway mobile radiotelephone service hearing before the FCC this month, but the USITA will not offer testimony unless the circumstances warrant. The hearing is on the application of National Bus Communications, Inc., that it be designated the agency for use of the frequencies to be assigned to the bus industry.

Major participants in the sessions, in addition to the bus organization, will be the A.T.&T. and Highway Radio, Inc., representing the American Trucking Association and various other trucking groups. The I.T.&T. will be represented by an observer.

Meanwhile, the Commission staff has launched a study of the plans of non-common carrier companies, including International Business Machines, General Electric, the Raytheon Manufacturing Co., and Federal Telecommunications Laboratories, to engage in projected communications services with their experimental radio relay systems. Both the IBM-GE and Raytheon applications propose common carrier communications.

Radio relay systems also enter strongly in the behind-the-scenes tug-of-war now taking place with the Civil Aeronautics Administration as the major party. The FCC has long worked with the CAA on tower locations, with a view to promoting flying safety. But the CAA, it has been learned, turns the tower applications over to two private organizations, the Air Transport Association and the Air Line Pilots' Association, for approval. This has led not only to considerable delays in processing applications, but also to an adamant attitude on the part of the two private groups against any towers at all on high ground, however well-marked and conforming to safety standards they might be.

Personalities

R. D. Minehart, mgr., Central City (Iowa) Telephone Company, reports that their board of directors have voted to purchase a new switchboard and to increase rates approximately 50% in 'order to meet rising costs.

●

R. B. Kennedy and **R. A. Gronau** succeed **John J. Hoffmann** and **H. A. Hillesheim** respectively on the board of directors of the New Ulm (Minn.) Telephone Company.

●

Frederic Peterson is the new owner of the Deer Park (Wisc.) Telephone Company, purchased from **C. F. Lewis.**

●

A. H. Dreyer, manager of the Starbuck (Minn.) Telephone Company, reports their rebuilding program of approximately $6,000 is well started.

●

R. D. Johnson, of the Detroit (Ore.) Telephone Company, will be the new owner of the Interurban Telephone Company, also in Detroit, after authorization of the purchase by Commissioner **George H. Flagg.**

●

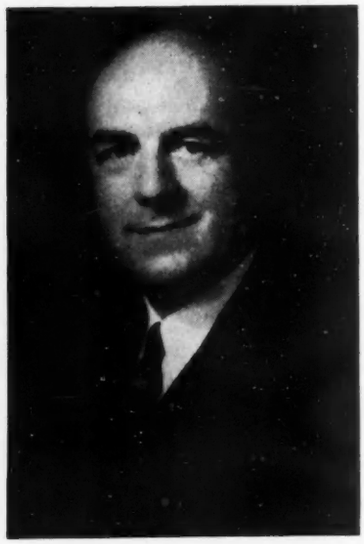
Wesley M. Angle, Stromberg's chairman of the board, is on a 7-week transcontinental motor tour and visiting Independent telephone companies en route to the Los Angeles and San Francisco offices of Stromberg-Carlson.

●

James H. Kellogg, president, Kellogg Switchboard and Supply Company, Chicago, reports the purchase of the Select-O-Phone Company of Providence, R. I., manufacturers of automatic telephone systems specializing in commercial and industrial fields.

●

Arthur L. Samuel, an authority on electron vacuum tubes and formerly with Bell Telephone Laboratories, became a member of the electrical engineering faculty at the University of Illinois on June 1.



George L. Best

George L. Best, formerly assistant vice president, American Tel. & Tel. Co., is now vice president of the Western Electric Company and in charge of securing necessary licenses under patents of others for use by the Bell System, and licensing others to use Bell System inventions.

●

Fred Pyle, vice president and general manager of the Iowa State Telephone Company, Newton, has been elected Newton's chamber of commerce president.

●

Charles Trierweiler is the new owner of the Northome (Minn.) Telephone Company.

●

Mrs. Frank Knefel, wife of **Frank B. Knefel,** manager of the Bucyrus (Ohio) Telephone Co., died May 17 while a patient in City hospital. We extend Mr. Knefel our deepest sympathy.

●

Donald Swinford has accepted the position of telephone manager of the Windsor (Ill.) Mutual Telephone Co.

Will Whitmore of the Western Electric Company will take part in the electronic engineering activities in connection with the atomic bomb tests to be held this summer. Upon completion of his assignment with the navy this fall he will resume his position as advertising manager with Western Electric.

●

W. K. Perkins, former assistant manager of sales for International Harvester Company, is now manager of sales. His background and experience well qualify him for his new assignment.

●

Henry C. Sheve, ex-Navy lt., has rejoined Stromberg-Carlson and been appointed staff engineer. **Frederic C. Young,** vice president in charge of engineering and research, also announced the return of **J. Russel Stewart** (Signal Corps major) to Stromberg-Carlson's engineering division. Mr. Stewart is to work on the development of carrier current telephone equipment. **Arthur W. Melloh** is also working on carrier current equipment and has been appointed to the telephone transmission group.

●

Fred Clarke, merchandise manager for Western Electric since 1939, retired June 1 after 40 years with the Bell System.

●

John Gorin, Santa Barbara plant engineer for Associated Telephone Co., Ltd., Santa Monica, Calif., uses his spare time to photograph the men on the job, and our cover picture is a sample of his excellent work. He not only takes his pictures, but does the developing and printing, and we look forward to more contributions like this cover photo.

●

Anton Gudajtes, treasurer of the Warsaw (N. D.) Rural Telephone Company since its organization in 1903 died recently at the age of 88.

Fig. 3—New pull type spinner (Cable Spinning Co.).

"Be not the last to LAY THE OLD ASIDE..."

A FAMILIAR axiom states, "Be not the first by whom the new is tried nor yet the last to lay the old aside." The sermon for today is, "Be not the last to lay the old aside."

There are many practices which are standard with large operating groups and which are worthy of adoption by all telephone companies. The use of *thimble eye bolts* at dead end points as shown by Figure 1 is typical of a method that is worthy of standardization. It provides a neater, faster and better job than the old wrapped method of dead ending. When the eye bolt method was first introduced some companies questioned the ability of the threaded portion of the eye bolt to hold the strains imposed. Any doubt in this direction has long since been disspelled. No single instance of a failure has ever come to our attention.

The use of the *spinner method* of suspending cable is another plant practice that has proven itself over a period of years, yet some companies still stick to rings.

This is partially due to inertia and partly to the fact that some companies do not have spinner machines. If only a few thousand feet of cable is to be spun, the hand method as shown in Figure 2 can be used advantageously. However, most companies will find that a spinner machine will pay for itself over a period of years. The new pull type spinner shown in Figure 3 represents a distinct improvement over former types as with it, it is no longer necessary for a lineman to ride along with the spinner. New small gauge 0.061 inch diameter galvanized iron wire is now available for use on the smaller cables, such as 15 and 26 pair. It insures a tighter bond between a small cable and its supporting strand.

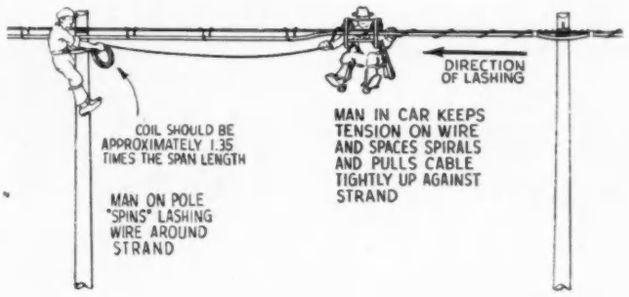

DIRECTION OF LASHING
COIL SHOULD BE APPROXIMATELY 1.35 TIMES THE SPAN LENGTH
MAN IN CAR KEEPS TENSION ON WIRE AND SPACES SPIRALS AND PULLS CABLE TIGHTLY UP AGAINST STRAND
MAN ON POLE "SPINS" LASHING WIRE AROUND STRAND

Fig. 2—Spinning short lengths of cable by hand.

Compression type sleeves have been standard practice with the larger companies for many years yet some small companies still persist in making the hand joint or double tubed sleeve joints. While double tube sleeves have given a good account of themselves over a period of many years, they lack the convenience and uniformity of results, typical of compression type sleeves. Full advantage should be taken of this method of splicing and the convenience of the several special types of compression sleeves as shown in Figure 4 should not be overlooked. Compression tools are inexpensive and no company is so small but that it affords this improved method of line wire splicing.

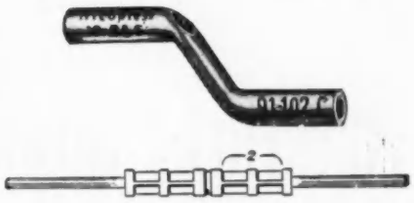


Fig. 4—Compression sleeves of National Tel. Supply Co.

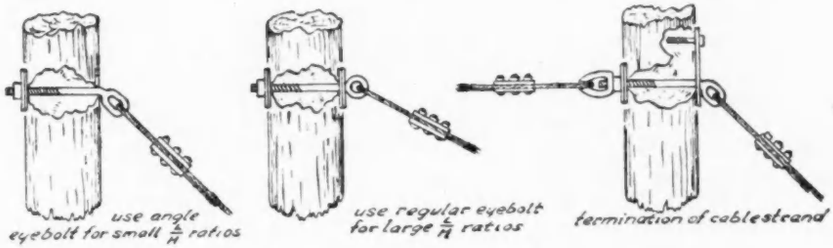


Fig. 1—Use of thimble eyebolts for strand guys and dead ends.

COURTESY PAYS OFF

SMART telephone companies have long recognized that the "voice with a smile wins" and that genuine courtesy and friendliness on the part of all employees in their dealings with the public are the two most necessary ingredients to good public relations. The public will often forgive discourtesy or lack of friendliness in a private business enterprise but it will seldom condone an equal degree of discourtesy, thoughtlessness or rudeness on the part of the employees of a public utility. It is therefore very important that utility managements be constantly alert to the need for a proper approach in dealing with the public.

As a part of its program to educate employees on the necessity for courtesy, one progressive telephone company recently set up a prize contest. The contest was titled *"Courtesy is more important in* 1946 *because—."* Participating employees were required to complete the above sentence using not more than 25 additional words. A total of $300.00 in U. S. savings bonds was offered as prizes.

Under the terms of the prize contest, ten $25.00 bonds will be awarded to the two employees in each of five departmental classifications writing the best statements. The best of the ten prize winning entries will be awarded a grand prize of an additional $50.00 bond.

The rules of the contest stated: (1) all employees except those connected with the contest are eligible, (2) entries should be written on paper 8½" x 11" in size, (3) statements should not contain more than 25 additional words, (4) contestant's name should not be written on the sheet containing the statement but should be written on a separate tag pinned to the entry, (5) the tag mentioned in No. 4 above should contain the following information: the employee's full name, department, and exchange, (6) entries must be received not later than ..... and (7) the judge's decision will be final and entries will not be returned.

Entries in the contest are to be judged on the basis of originality of thought, and the judges will consist of representatives of each of the operating departments plus one representative from the public relations department and one from the personnel department. The contest mentioned is being conducted by the Southern Bell Telephone and Telegraph Company with principal office at Atlanta, Georgia. Here is an idea that Independent company executives might profitably adopt.

"Stop following me, my company is not interested in hand decorated telephone poles!"

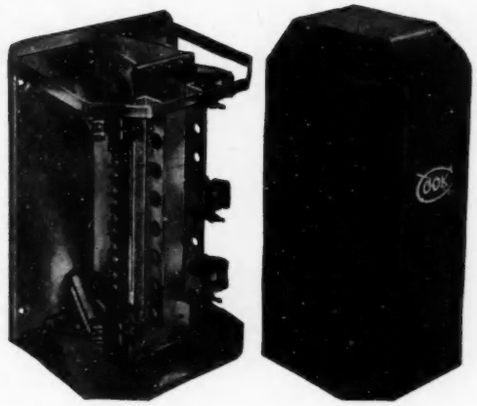
INDUSTRIAL COLOR SCHEMES

INCREASING use is being made of standardized industrial color schemes in manufacturing and other plants. The purpose of the color scheme is to make the surroundings more attractive, and by color contrast, to emphasize danger areas or equipment with which employees should be particularly careful. It would seem that the idea of putting color to work could advantageously be employed in telephone terminal rooms, switch rooms, etc.

As a typical example of the use of color in industry, one manufacturer has painted his ceilings a light green and the walls a light yellow. Punch presses, lathes, drills, etc., are painted a shade of green which is darker than the tint used for the ceiling. Control areas are either orange or yellow depending on the type of operation involved. Safety release buttons are painted yellow with an orange background. Switches, and other electrical equipment are usually painted orange. Bright red is used for fire equipment. Lockers are a light buff tint and areas around door handles and time clocks are black. Over-head piping is painted to match the ceiling but a color code is used to establish the character of the piping. The code used is: yellow - acetylene gas; orange - oxygen; green -air; white - water; black - city gas; and blue - steam. Pipes are identified by a small triangular rectangle of color which is stenciled on the pipe at intervals of 4 to 8 feet.

Type IT-20

INTERIOR CABLE TERMINAL



The Type IT-20 Interior Cable Terminal, a part of the Trans-Mount System, is especially designed for the termination and protection of cables and sub-station equipment in barracks, manufacturing plant units, etc., where protection is required on both the cable and drop sides.

Type H-20-T Dual Gap Protector units are installed as required. Furnished in 11, 16, 26 and 51 pair sizes. Illustration shows the IT-20 with streamlined dust-proof terminal vault.

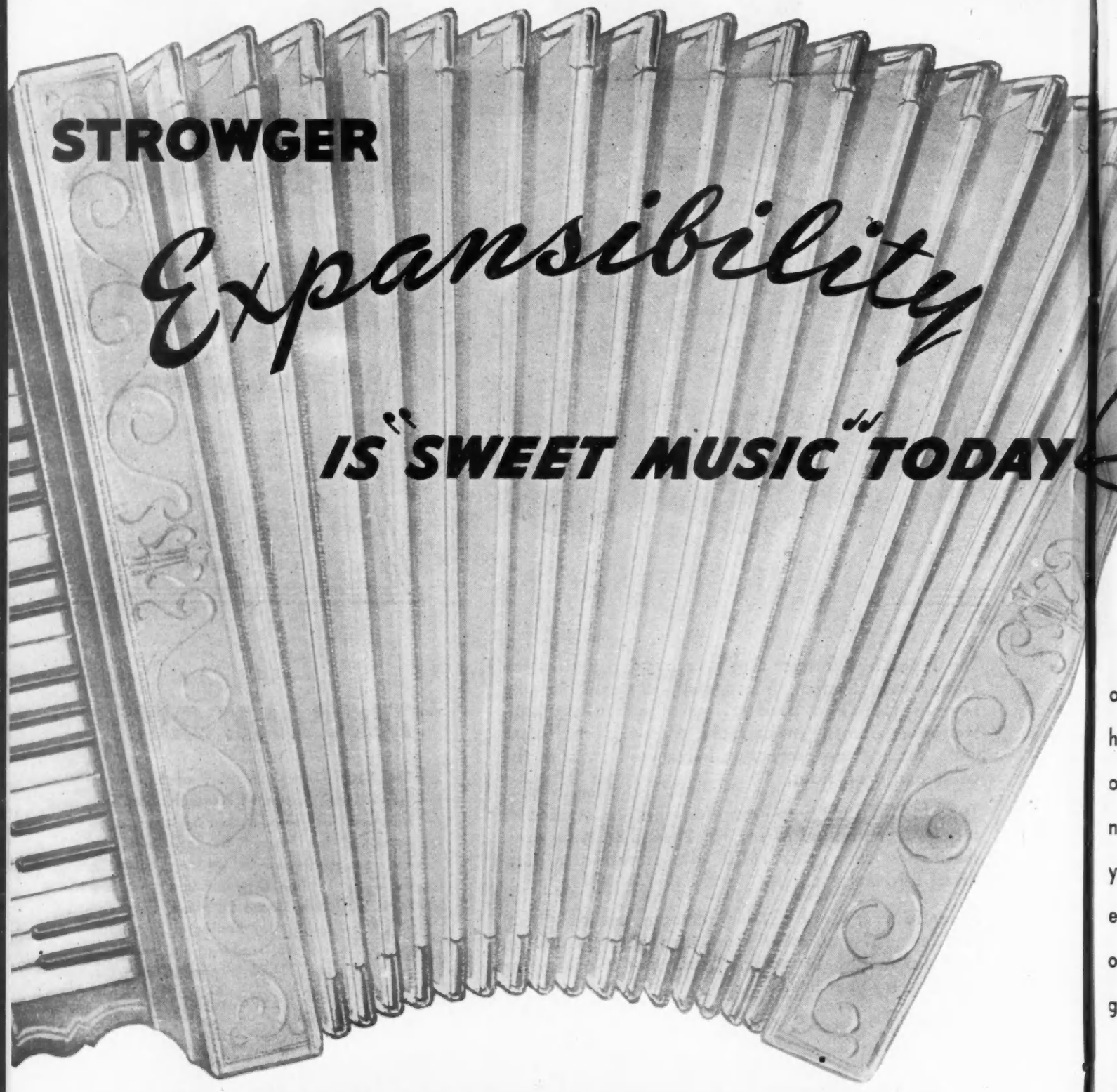
Refer to your Cook catalog for complete details on this terminal and other Cook telephone protective and distributing products. Remember, Cook is the best line for your lines.

The TRANS-MOUNT SYSTEM

The Type IT-20 is a part of the Cook Trans-Mount System of Protection and Distribution. The Trans-Mount System is composed of the Type IT-20 Interior Cable Terminal, the Type R Sub-Station Protector, the Type T Main Distributing Frame, the Type S-20 Pole Cable Terminal, the Type U Utility Sub-Station Protector, the Type UA-20 Aerial to Underground Terminal and the Type TN-20 Interior Cable Terminal, all using the Type H Protector Unit.

COOK ELECTRIC Company

2700 SOUTHPORT AVENUE • CHICAGO 14, ILLINOIS



STROWGER

Expansibility

IS "SWEET MUSIC" TODAY

AUTOMATIC ELECTRIC

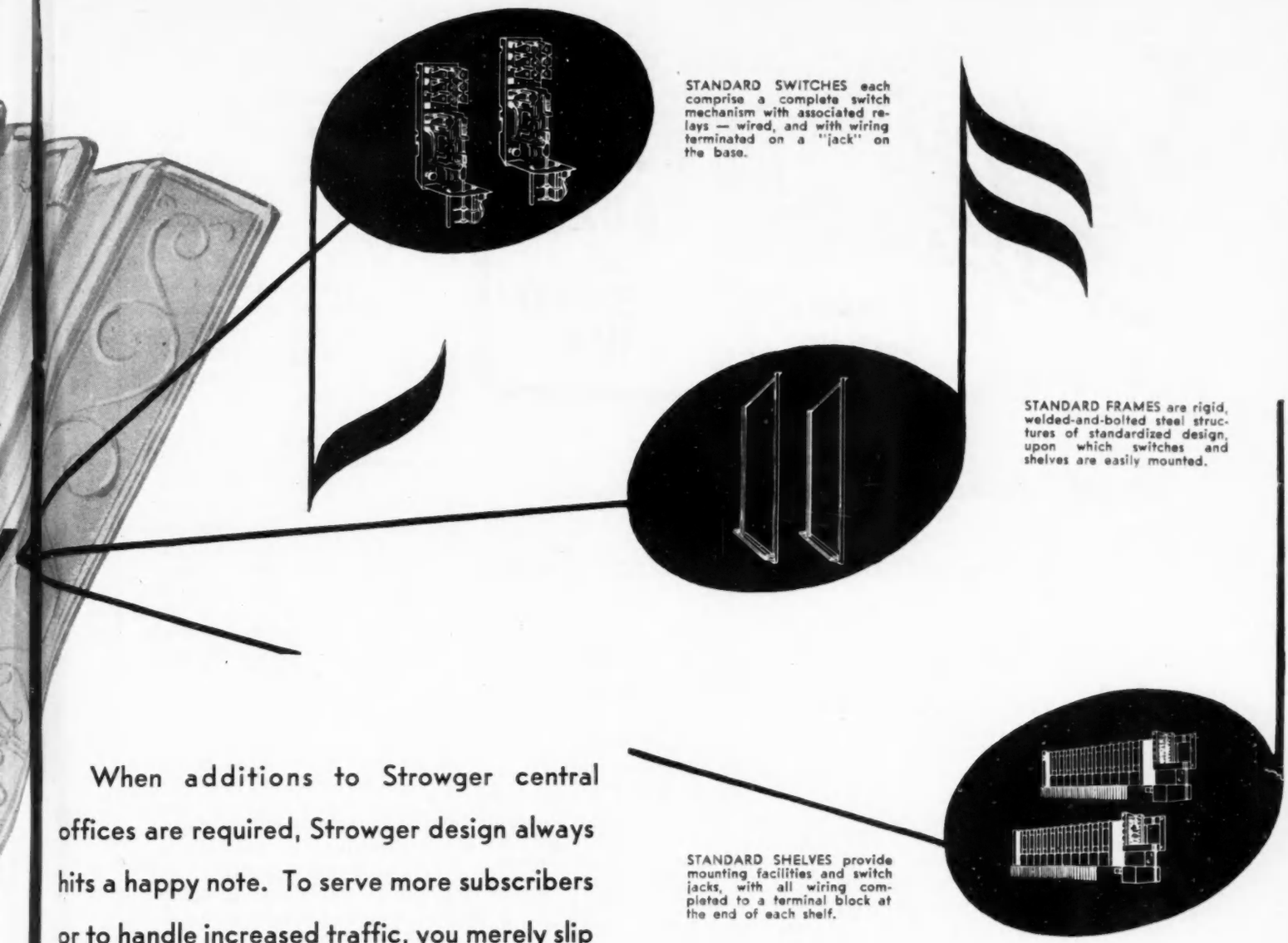
Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.

Export Distributors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION



STANDARD SWITCHES each comprise a complete switch mechanism with associated relays — wired, and with wiring terminated on a "jack" on the base.

STANDARD FRAMES are rigid, welded-and-bolted steel structures of standardized design, upon which switches and shelves are easily mounted.

STANDARD SHELVES provide mounting facilities and switch jacks, with all wiring completed to a terminal block at the end of each shelf.

When additions to Strowger central offices are required, Strowger design always hits a happy note. To serve more subscribers or to handle increased traffic, you merely slip new switches into place. For further growth, you simply add new shelves or frames, with equipment as needed. In all cases, the original equipment remains unchanged—and growth takes place without "growing pains."

Today, this "step-by-step" expansibility is setting a new high in its value to telephone companies. With present unavoidable shortages of central office facilities, it provides savings in equipment and time — as well as in dollars — which make it a priceless boon for meeting urgent service needs.

Today, unforeseen expansion which, with less flexible equipment, would necessitate complete rebuilding of central offices, is being satisfied with a minimum number of Strowger switches, shelves and frames. Once again, Strowger design is giving convincing proof of its superiority—and demonstrating why most telephone companies "going automatic" specify "STROWGER Automatic."

Telephone Engineer's RADIO COURSE FOR TELEPHONE MEN

Chapter 14
Section 2

Application of Carrier Current Systems to Radio Links

Band Width Requirements

The band width requirements for a radio carrier which carries a multiplicity of wave filter type channels, depend on the frequency spread of the wave filter system used and the particular radio frequency band employed. A single channel system operating with an upper frequency of 9,350 cycles would, for example, require an audio channel slightly greater than this upper frequency but the radio frequency channel requirement would, or course, depend on the type of modulation employed.

With a frequency modulated radio link, it would be several times that of the highest carrier channel frequency. For

By B. C. BURDEN

Technical Consultant

Lincoln, Nebraska

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the 152-162 megacycle band it would be above fifty thousand to seventy-five thousand cycles. The higher the frequency of the radio carrier, the wider will be the band width requirements for a given audio channel width.

The frequency allocation for the several types of Lenkurt systems are shown in Fig. 187 and should prove helpful in working out band width problems in connection with the use of wave filter multi-channel systems on radio links.

Conclusion of Radio Course

The final chapter of our popular Radio Course for Telephone Men is carried in this issue of TELEPHONE ENGINEER & MANAGEMENT.

This special feature of our magazines has attracted wide attention and according to reports has been very popular and useful to many of our readers.

Having laid an excellent groundwork for the benefit of those telephone men interested in radio as applied to the telephone field, we expect to carry considerable additional information on this subject from time to time.

This will consist of a series of articles which will deal with specialized phases of radio of general interest to telephone people.

Readers interested in this new tool which will play such an important part in the telephone plant of the future, may look with assurance to TELEPHONE ENGINEER to keep them fully posted on every new development pertinent to the use of radio in the telephone field.

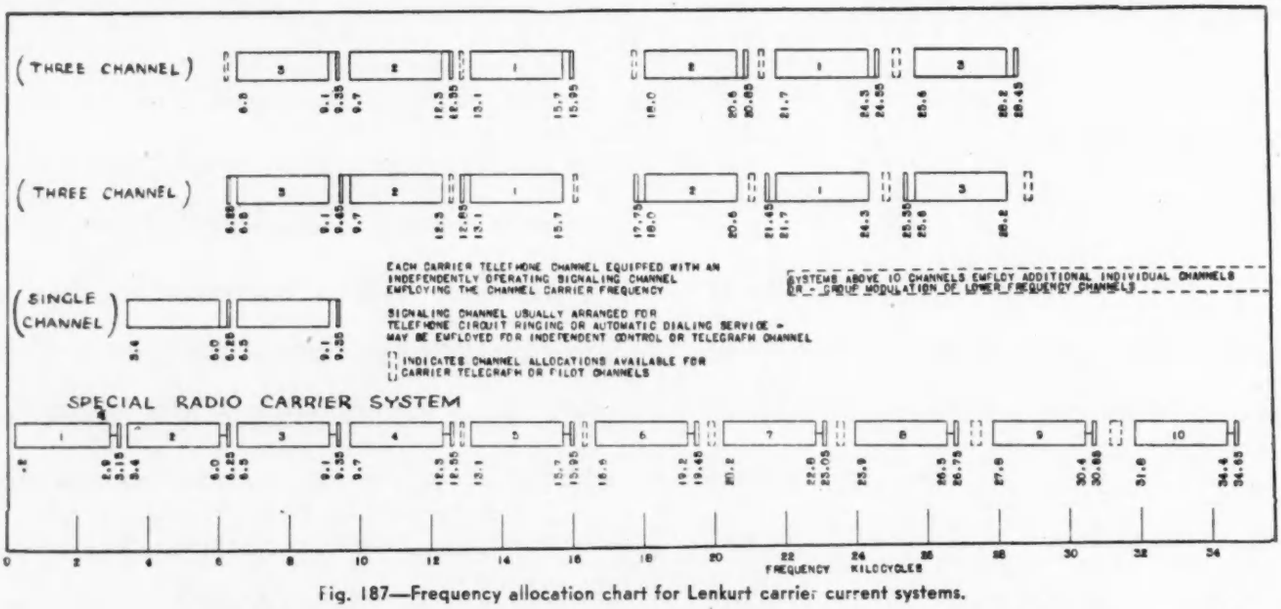

(THREE CHANNEL)
(THREE CHANNEL)
(SINGLE CHANNEL)
EACH CARRIER TELEPHONE CHANNEL EQUIPPED WITH AN INDEPENDENTLY OPERATING SIGNALING CHANNEL EMPLOYING THE CHANNEL CARRIER FREQUENCY
SIGNALING CHANNEL USUALLY ARRANGED FOR TELEPHONE CIRCUIT RINGING OR AUTOMATIC DIALING SERVICE - MAY BE EMPLOYED FOR INDEPENDENT CONTROL OR TELEGRAPH CHANNEL
INDICATES CHANNEL ALLOCATIONS AVAILABLE FOR CARRIER TELEGRAPH OR PILOT CHANNELS
SYSTEMS ABOVE 10 CHANNELS EMPLOY ADDITIONAL INDIVIDUAL CHANNELS OR - GROUP MODULATION OF LOWER FREQUENCY CHANNELS
SPECIAL RADIO CARRIER SYSTEM
FREQUENCY KILOCYCLES

Fig. 187—Frequency allocation chart for Lenkurt carrier current systems.

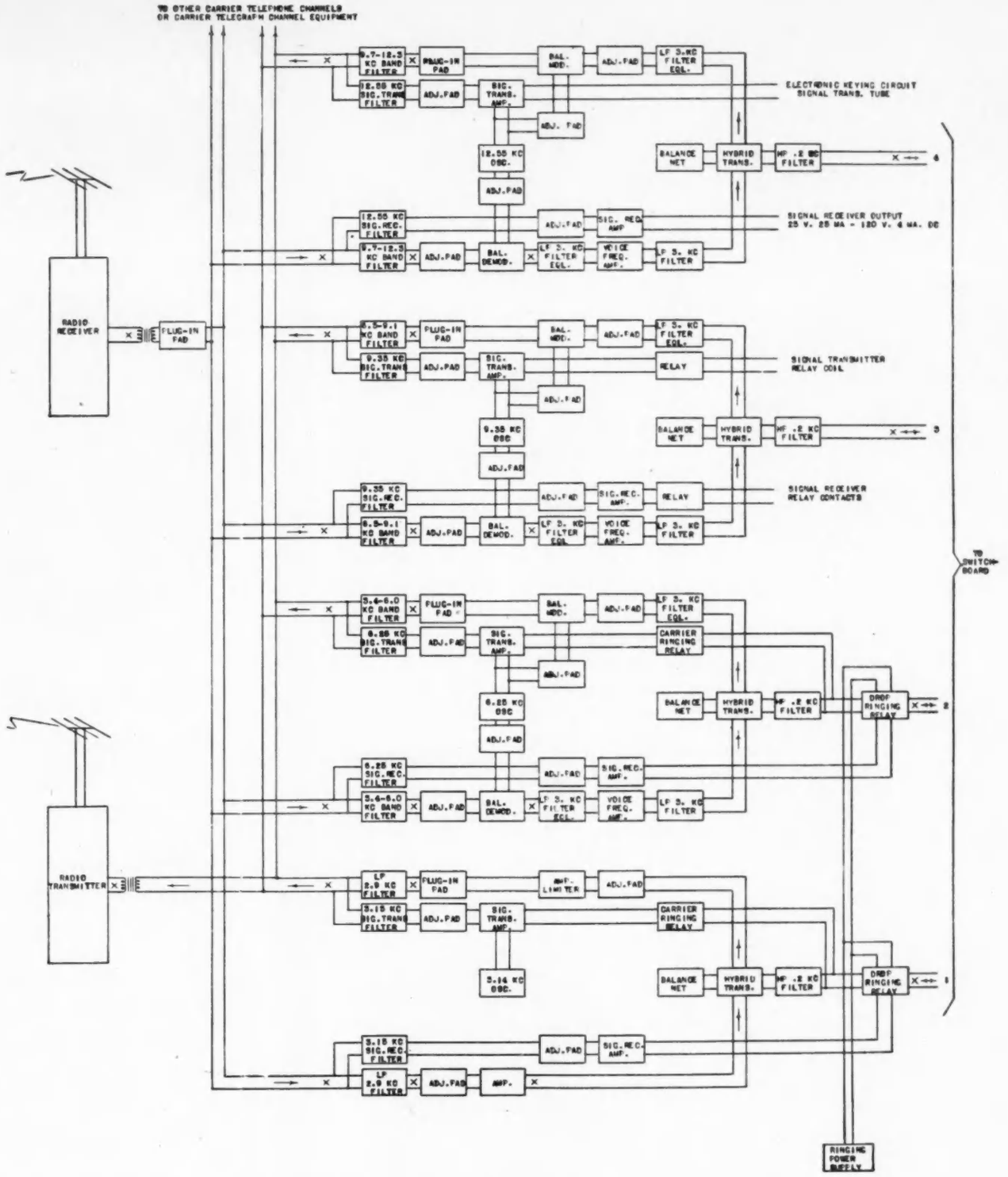

TO OTHER CARRIER TELEPHONE CHANNELS OR CARRIER TELEGRAPH CHANNEL EQUIPMENT
RADIO RECEIVER
RADIO TRANSMITTER
PLUG-IN PAD
ELECTRONIC KEYING CIRCUIT SIGNAL TRANS. TUBE
SIGNAL RECEIVER OUTPUT 25 V. 25 MA - 120 V. 4 MA. DC
SIGNAL TRANSMITTER RELAY COIL
SIGNAL RECEIVER RELAY CONTACTS
TO SWITCHBOARD
RINGING POWER SUPPLY

Fig. 188—Block diagram of a four channel radio link system (Courtesy Lenkurt Electric Company).

General Arrangement of a Multi-Channel System

A block diagram of a four channel wave filter carrier telephone system applied to a single radio link is shown in block diagram form in Fig. 188. An outstanding feature of this system is that each of the channels is provided with its own signalling circuit which is independent of the voice circuit. As previously pointed out, this circuit can be used for signalling, telegraph service or toll dialing.

Multi-Channel Wave Filter System with Urban Mobile Radiotelephone System

The number of separate channels that will normally be required for an urban-mobile radiotelephone system will depend on the subscriber loading that can be employed. It has been the experience of the Bell Telephone System in connection with its coastal harbor marine radiotelephone service that as many as 100 subscriber can be placed on a single channel. Whether or not such loading can be obtained with urban mobile radiotelephone services will, of course, remain to be seen.

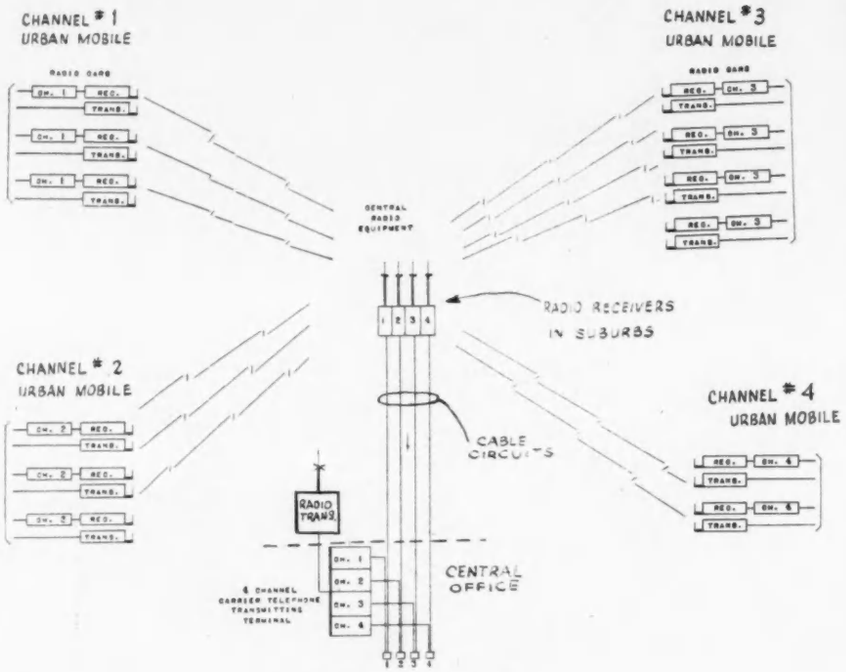


Fig. 189—Use of carrier current systems for urban mobile radiotelephone service (Courtesy Lenkurt Electric Company).

In general, it would appear that 20 to 30 subscribers will, at least in some instances, be the maximum number that can be placed on a single channel. It will therefore be necessary in many cities where urban mobile service is to be rendered to use several channels. In order to avoid a multiplicity of radio transmitter antennas as well as the cost of separate transmitting terminal units, it is feasible to employ the carrier current multi-channel principle on the central office transmitting end as shown in Fig. 189.

In this type of installation the carrier current principle is employed only on the transmitting end. Separate receivers and receiving antennas are used

(Please turn to page 62)

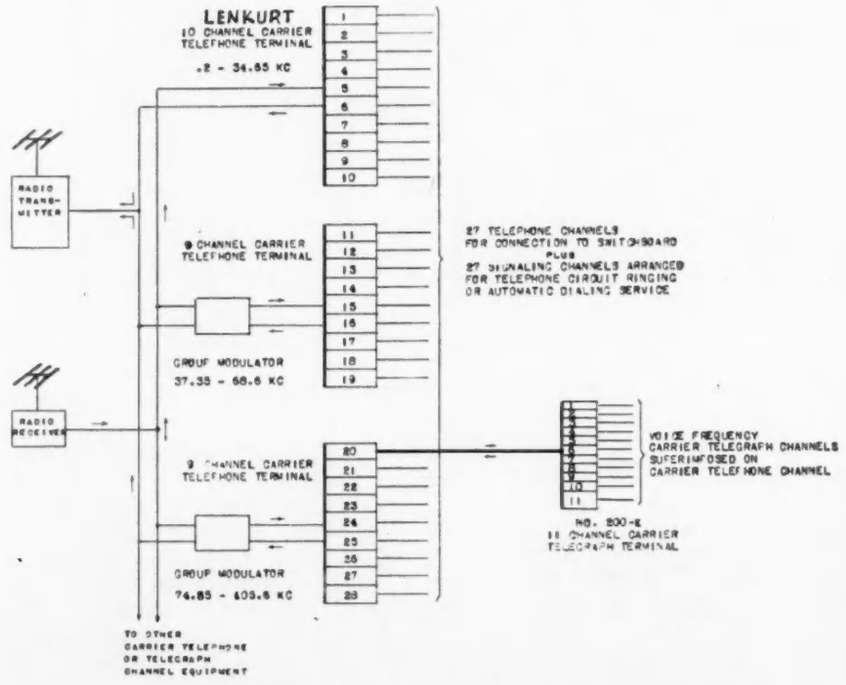

LENKURT
10 CHANNEL CARRIER TELEPHONE TERMINAL
.2 - 34.85 KC
RADIO TRANSMITTER
9 CHANNEL CARRIER TELEPHONE TERMINAL
27 TELEPHONE CHANNELS FOR CONNECTION TO SWITCHBOARD PLUS 27 SIGNALING CHANNELS ARRANGED FOR TELEPHONE CIRCUIT RINGING OR AUTOMATIC DIALING SERVICE
GROUP MODULATOR
37.35 - 68.6 KC
RADIO RECEIVER
9 CHANNEL CARRIER TELEPHONE TERMINAL
GROUP MODULATOR
74.85 - 105.6 KC
VOICE FREQUENCY CARRIER TELEGRAPH CHANNELS SUPERIMPOSED ON CARRIER TELEPHONE CHANNEL
NO. 800-K
11 CHANNEL CARRIER TELEGRAPH TERMINAL
TO OTHER CARRIER TELEPHONE OR TELEGRAPH CHANNEL EQUIPMENT

Fig. 190—Use of group modulator principles to obtain a multiplicity of channels.

STROMBERG CA

armstrong's

"whitall tatum" glass insulators

Backed by 107 years of glass-making experience, "Whitall Tatum" Glass Insulators, manufactured by the Armstrong Cork Company, give dependable service even under the most rugged conditions.

All raw materials are rigidly tested; quality of glass is batch-checked, and each stage of production is automatically controlled.

"Whitall Tatum" Glass Insulators will stand up . . . as the records of many operating companies can prove. Because of their crystal clarity, they are less subject to malicious breakage after installation.

Tests show the transverse strength of "Whitall Tatum" Glass Insulators exceeds that of supporting pins.

Outstanding characteristics of these insulators are:

- *Accurate Dimensions*
- *True Pin Fit*
- *Crystal Clarity*

Conform to, or exceed, A.S.T.M. standards.

STROMBERG CA

BRANCH OFFICES: CHICAGO 6. KANSAS CITY 8, S

G CARLSON *Recommends*

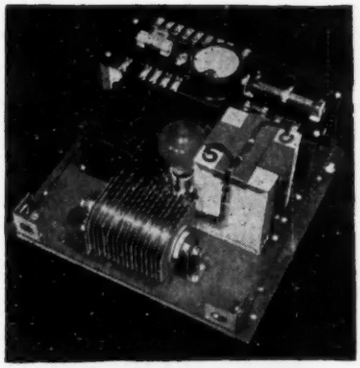
. . . bigger savings plus better service with

raytheon rectifilters!

For more than six years, leading independent telephone companies have found that Raytheon Rectifilters are the most economical and efficient way to supply steady DC power to PBX boards directly from an AC source.

With no moving parts, the Raytheon Rectifilter requires neither adjustment nor maintenance. It will outlast many sets of batteries, release wires carrying charging current from central office to subscribers' PBX boards for revenue producing service, and minimize power cost because of high efficiency in converting from AC to DC.

Dry disc rectifying units and other components are designed for long-life, trouble-free service. The Raytheon Rectifilter will end your telephone power problems. Just plug it in, close the door—and forget it!



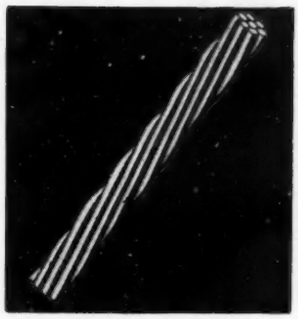
NO. 1044-E RECTIFILTER
WITH COVER REMOVED

crapo

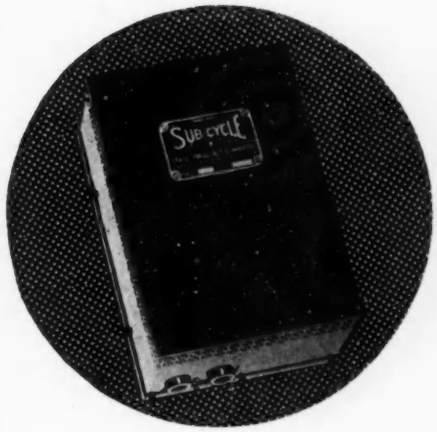
guy and messenger galvanized strand

The superior tensile properties inherent in steel are used to full advantage in *Crapo* Galvanized Strand. The tightly adherent zinc coating applied by the *Crapo* Galvanizing Process provides lasting protection against corrosion, and prolongs the life of the strand. Controlled ductility makes *Crapo* Strand easy to work and to serve. Low first cost and low yearly cost result in important economies for operating companies.

The all-round dependability of *Crapo* Galvanized Steel Strand is being demonstrated constantly by its outstanding performance in service. There is a size and grade for all practical needs.



LONG LIFE—LOW COST



sub-cycle

ringing current for every purpose . . .

Sub-Cycle is the wise choice wherever powerful ringing current is required. For the Sub-Cycle "Master" is an exclusive development in an *alternating current* Power Ringing Converter which is amazingly efficient.

No moving parts. Nothing to lubricate. Economical and quiet in operation. Causes no radio interference. Requires no routine maintenance.

Sub-Cycle "Master" is available in a series of 6 models to suit every need—ranging in output from 7½ to 45 watts, covering every use from P.B.X.'s to central offices.

Make your next installation Sub-Cycle . . . "the choice of the Telephone Industry."

G CARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

ISAS CITY 8, SAN FRANCISCO 3; IN CANADA: STROMBERG-CARLSON COMPANY LIMITED, TORONTO

STROMBERG Telephone CARLSON

News Briefs

(Continued from page 25)

were showered with the applause of their fellow employees.

The veterans who were highly complimented at the banquet were: Richard H. Aughinbaugh, Hugh G. Whaley, Glenn Ormah, Herbert G. Moss, Charles L. Drake, Forrest F. Bauer, Loren W. Barcus, Samuel Charleck, Stanton C. Stewart, Carl W. Carter, William A. Lanter, Joseph S. Isbell, Roger B. Withers, Leroy L. Haring, William M. Groves, Frank N. Engles, John F. Dersch, Kenneth Johnson, Stanley B. Wilson, Ralph M. Clark, Virginia M. Hale, Virginia Havey, Dale Wright, Mark Holmes, Lucile Thompson, Ralph H. Aaron, Margaret Utz, George E. Newport, Herbert H. Hart, Crockett Arthur and Ernest W. Johnson.

G. O. Perry, vice president of the Citizens company, who spoke briefly, told the group that the telephone company is not the miles of cable and other equipment, but "the people here tonight are the company." He also paid tribute to these employes for the "fine work" they had done during the war when there were so many handicaps and to the returned veterans, welcoming them home.

Clifford McCormick, vice president and general manager of the company, spoke briefly, stressing the fact that the dinner had been sponsored by employees to pay "due honor" to those with whom they have worked who had served their country, and that it was their way of saying "thanks" to them for this service. He added, "Patriotism cannot be purchased or rewarded, but it can be appreciated. The company welcomes all its veterans back and needs all of them back on their jobs."

The committee who made arrangements for the party under the chairmanship of Harry J. Cline and including N. C. Ellspermann, Aubrey Boyd, Lucile Campbell, Elizabeth Daily, Francis Jones, Lila Forsythe and Walter Eisenhut were highly praised for their work in making the dinner a success.

Paul N. Bogart, vice president and director of the Citizens Independent Telephone Co., and Anton Hulman, Jr., also a director, were guests of honor as well as Terre Haute's mayor, Vern McMillan.

The presents to the servicemen were individually initialed billfolds.

Foreign Exchange Tariffs

The Michigan Public Service Commission recently approved the preparation and filing of tariff sheets in accordance with regulations and tariffs for Foreign Exchange Service by the Shiawassee-Genesee Telephone Company, New Lothrop, Michigan.

James P. Borden

Executives Promoted At Va. Tel. & Tel.

C. C. Ward, for the past six years the Virginia Telephone & Telegraph Company's district manager for Virginia and West Virginia, with headquarters at Charlottesville, has been named division auditor for the Va. T. & T. Co. in Virginia and for the Central Telephone Company's interest in West Virginia, North Carolina, Georgia, and Florida, according to an announcement by Col. L. D. Densmore, vice-president and general manager of the Virginia company.

Colonel Densmore also announced that J. P. Borden, district plant superintendent for Virginia and West Virginia, has been named Charlottesville district manager. He will be operating head of the company's properties in Charlottesville and Albemarle County, including the new dial exchange which is to be established at Crozet, and of the exchanges at Stanardsville and Palmyra.

F. M. Moody, at present group manager of the Charlottesville exchange, has been made field auditor in Mr. Ward's newly created accounting division.

Mr. Borden, new head of the company's operations here is a native of Shenandoah County and was educated at Mercersburg Academy, Mercersburg, Pa., and Virginia Polytechnic Institute. He entered the telephone business at Front Royal, Va., in 1920 and served as manager of the Royal Telephone Company there for 14 years. Going to Charlottesville in 1933 as plant superintendent for the Charlottesville exchange, he was made district plant superintendent in 1944. He is president-elect of the Charlottesville Rotary Club and in 1945 served as president of the Virginia Independent Telephone Association.

Mr. Ward, a native of West Virginia, was employed by the Albemarle County Telephone Company of Charlottesville from 1912 to 1931 in accounting work and in charge of accounting. From 1931 until his appointment as district manager he held commercial and managerial positions with the Virginia Telephone & Telegraph Company. He was president of the Virginia Independent Telephone Association in 1937.

Division accounting, engineering, traffic and commercial departments are being established in Charlottesville, Colonel Densmore explained, in line with the company's recent announcement that general offices were to be established in Charlottesville.

Authorize Rate Increase

The Inola (Okla.) Telephone Company, owned by O. H. Mullen, has received permission from the Oklahoma Corporation Commission to increase rates as follows:

Service	Old Rates	New Rates
Business	$2.25	$3.00
Residence	1.25	1.75
Rural multi-party	1.25	1.50
Rural switched	4.00	6.00

New Exchange

The Lincoln Telephone Company, Wentzville, Missouri, has received authorization to establish a dial telephone exchange at New Melle, Mo.

CALCULAGRAPH

Has Served The Telephone Industry

54 YEARS

Measuring The Elapsed Time of Toll Calls

MODEL 33
CALCULAGRAPH

FOR 54 years Calculagraph, the simple dependable timing device that calculates, has been standard equipment in the telephone industry for computing and recording accurately the elapsed time of toll calls.

CALCULAGRAPH COMPANY

310 SUSSEX STREET • HARRISON, NEW JERSEY

A successful recruiting drive will go a long way toward enabling the whole telephone industry to render faster, better service for all.

The Bell System is telling as many young women as possible about the opportunities open to them in the telephone field. The advertisement on the opposite page appears in national magazines during June and July.

Lines to the LADIES

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

"Sounds like opportunity to me!"

If you are looking for a career, your Bell Telephone Company may have exactly what you want—work that's interesting, important and pleasant.

Right now in many places Bell Companies need young women to help meet the demand for telephone service.

Wages and working conditions, good. Associates, friendly. Annual vacations with pay. Benefit payments. Attractive openings of many kinds.

Ask the nearest Bell Telephone employment office to tell you what opportunities there are in your community.

BELL TELEPHONE SYSTEM

NEW PRODUCTS and Applications

Hacksaw Blade Holder

Here is a 4-in-1 tool; saw-knife-scraper-file—for all-around household needs, difficult close-quarter work, repairmen, etc. It uses broken hacksaw blades, thin flat files and similar tools. Manufactured by the A. D. McBurney Manufacturing Company, it is priced at $0.95 postpaid.

For further information, please mail a postcard to the New Products Editor, Telephone Engineer Publishing Corp., 7720 Sheridan Rd., Chicago 26, Ill

New Soldering Iron

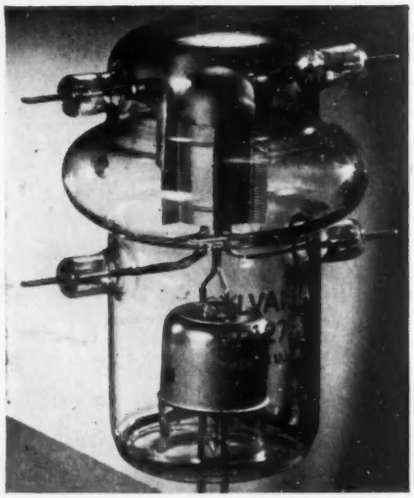
A patented, automatic-feed, electric soldering iron, the Eject-O-Matic, is being introduced by the Multi-Products Tool Company. This new iron is trigger operated and ejects a measured amount of solder from a reel concealed in the handle. A special retracting feature prevents the melting of excess solder on the heating tip. The actual amount of solder deposited each time the trigger is pulled is regulated by a micrometer adjusting wheel mounted in the handle of the iron easily accessible to the operator's thumb.

For further information, please mail a postcard to the New Products Editor, Telephone Engineer Publishing Corp., 7720 Sheridan Rd., Chicago 26.

Power Measurement Lamps

Simple, direct measurement of the power output of electronic and radio communication equipment at frequencies up to 900 mc. are provided by six types of Power Measurement Lamps that are made by Sylvania. Built with two identical small filaments and mounted in lock-in type bases these lamps measure power outputs ranging between 0.05 and 25 watts with accuracies within 5% or less depending on the type of reading taken.

Power output measurements are made by connecting one filament to the high frequency output and the other to an a-c or d-c source. Voltage of the second filament is regulated until both filaments are equally bright. Power is determined by meter readings in the a-c or d-c circuit with equal power dissipated by the filament in the high frequency circuit.



Increased accuracy may be obtained by reversing the filament circuits and averaging results. Calibration, providing increased accuracy independent of filament difference may be obtained by applying voltage or measuring the current of one filament and then applying voltage to the other until the two filament brightnesses are equal. Power dissipated by the second filament is then calculated in terms of voltage or current in the first filament.

Useful range may be extended when a dark glass filter is used for visual filament comparison or photo cell measuring equipment is used. Filament characteristics assure constant temperature and color for dissipation or a given amount of d-c or high frequency a-c power. Ratings, characteristics and curves of six types of power measurement lamps may be obtained on request to this column.

Stevens-Arnold Switches

Stevens-Arnold switches are frequency controlled tuned relays and therefore particularly well suited for remote control applications with either wire or radio as the carrier medium.

In the radio application, the switches are sufficiently sensitive so that when made on special order they can be controlled from either a crystal detector or vacuum tube receiver. Response time is only a small fraction of a second.

Each switch is adjusted at the factory to accept a selected band of frequencies in the range of 20 to 800 cycles per second and to reject all others. In other words, one switch might be controlled by the band from 50 to 60 cycles, another by the band from 65 to 75 cycles, another by the band from 80 to 95 cycles, etc.

When more than one switch is connected together, the combination provides a means of selective switching by a choice of frequency bands. The range of 20 to 800 cycles is adequate for the control of many separate switches on a single carrier circuit, and by combining the frequency bands in a coded sequence, any number of selective switching operations can be obtained.

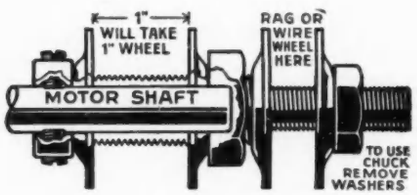
Frequency selection and rejection is obtained by using the well-known vibrating read principle with hermetic sealing and other design features which make the switches maintenance free.

Seven binding posts are supplied. One set of binding posts is for the selected-frequency AC, required to control the switch. Another set is for the auxiliary power required to operate the switch The remaining three are the switch terminals, this being a single pole double-throw model.

For further information, mail a post card to this column.

Combination Arbor

A drilling or grinding wheel attachment for ½" motor shafts is being produced by the A. D. McBurney Manufacturing Company. This attachment will take a grinding wheel with ¾" hole on shaft and ½" hole on small end. Extension can be used for rag or wire wheel, or ½", 24-thread drill chuck which holds drills from No. 60 to ½" in diameter, priced at $1.50.



For further information, please mail a postcard to the New Products Editor, Telephone Engineer Publishing Corp., 7720 Sheridan Rd., Chicago 26, Ill.

Water Cooler Booklet

The new booklet of Sunroc Refrigeration Company, makers of Sunroc Water Coolers, is just off the press. This attractive, 2-color booklet contains full information about the complete postwar line of Sunroc AC and DC Water Coolers, for business, industrial, and institutional use. All Sunroc models are illustrated, and complete specifications of each are given. This Sunroc booklet may be had by writing to New Products Editor, Telephone Engineer Publishing Corp., Chicago 26, Illinois.

More Pay Station Calls

Perhaps you've seen the cartoon of the customer asking the operator, "Could you give me change for a quarter?" but most of us have wished many times she could. Now the Vendo Company has designed a Coin Changer that performs that operation and should increase telephone calls in pay stations and further public good will.

Models in operation so far in defense plants, etc. have increased vending machine sales up to 30%. A limited production run of the Coin Changer has already been completed and plans are now under way to establish distributors.

If you are interested in further information and prices on the Coin Changer, drop a postcard to the New Products Editor.

In Kansas City's Union Station an average of $28 a day is run through the Coin Changer by telephone patrons.

New Capacitor Manufacturing Process

The War Department has recently released a report on a new method used by the Germans for the manufacture of capacitors. German machinery is now being shipped to this country to try out the process. It consists essentially of replacing the usual metal foil with a thin, vaporized zinc coating. This is sprayed directly onto the paper dielectric.

It is claimed that this type of capacitor offers the advantage of being self-healing after an electrical breakdown. It is stated that numerous breakdowns may occur before the effective value of the capacitor is reduced below the workable leakage limits. These metal vaporized capacitors can be operated at from 20 to 50% higher voltage than is possible with the ordinary paper and metal foil capacitors according to the report.

New Plug-In Relays

The Ward Leonard Electric Company, Mount Vernon, New York, have new hermetically sealed plug-in relays available now, designed for A.C. or D.C.

New Plug-In Relays are vibration resistant to 10 times gravity. They are advantageously used in electronic installations.

Completely encased in a cylindrical can, these compact midget type relays provide excellent protection against adverse atmospheric conditions such as moisture, dust, gases, corrosion, etc. Relay coil and contact connections are totally enclosed within the metal housing and are brought to the prongs of a standard octal plug base.

Indent Connector Lugs

A new electrical lug useful for terminations on power wires requires no solder. An excellent connection with either stranded or solid wires is obtained by the uue of compression pliers which indent the lug so that it is mechanically and electrically bonded to the wire. The new lug is the product of the Burndy Engineering Company.

Lightweight Soldering Iron

A small lightweight quick-heating soldering iron for use in instrument repair work of a delicate nature has been developed in an overseas Signal Corps repair shop.

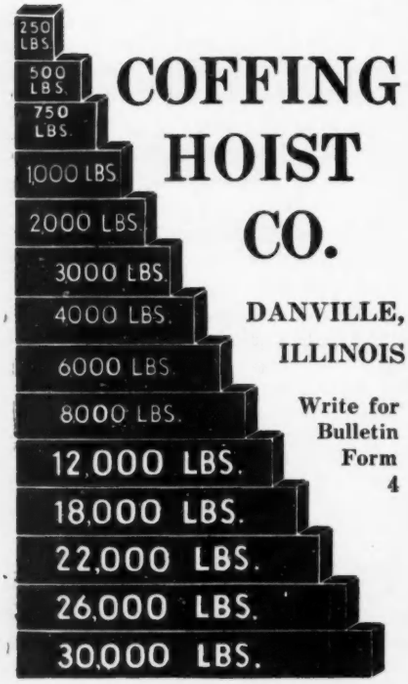
These irons can be brought from cold to effective heat in 45 seconds. The smallness of the irons makes it possible to reach hard-to-get places, and to perform delicate soldering jobs in meters. There is enough heat retention for good results.

The heater assembly consists of a transformer having an output of 6 to 12 volts, with a current capacity of 10 to 30 amperes. The power source can be 110 or 220 volts, depending upon the transformer available. Two carbon electrodes are used, and these can be obtained from a standard BA-30 flashlight cell. A suitable fuse is placed in the primary circuit of the transformer for protection against accidental shorting of the secondary.

The basic principles of operation are that with the soldering iron tip inserted between the two carbon rods a current is permitted to flow in the secondary circuit. At the point of contact between the soldering iron tip and the carbon rods a high resistance contact results forming a small electric arc. The heat developed at these points of contact heats the iron.

COFFING HOISTS

COFFING HOISTS are built in a wide range of capacities. The SAFETY-PULL Ratchet Lever Hoists come in capacities from ¾ to 15 tons. The QUIK-LIFT Electric Hoist is built in 28 different models with capacities ranging from 250 to 4000 pounds and the MODEL Y-C Spur Geared Hoist is built in seven capacities from ½ to 5 tons. As more materials become available more COFFING HOISTS will be built to meet your requirements. Contact your supplier for detailed information.



COFFING HOIST CO.

DANVILLE, ILLINOIS

Write for Bulletin Form 4

Dr. Bowles on Automatic's Consulting Staff

Automatic Electric Company has announced that Dr. Edward Lindley Bowles, who has been on the staff of the Massachusetts Institute of Technology since 1920 and was head of Electrical Communications there from 1924 to 1942, and who is one of the country's leading authorities in the field of electrical communications and electronics, has been retained to act as consultant to the Company on research and development.

Professor Bowles holds the degree of Master of Science from the MIT. He received the honorary degree of Doctor of Science from Norwich University in March 1945.

Dr. E. L. Bowles

The preeminent position of MIT in the field of ultra-high frequency techniques at the outbreak of World War II was due largely to his early visualization of the potentialities of this region of the electromagnetic spectrum and to his direct supervision of the Institute's teaching and research programs in this broad field.

From July 17, 1940 to April 1942, he was a charter member and served as Secretary of the Microwave Section of the National Defense Research Committee of the Office of Scientific Research and Development.

Dr. Bowles holds membership in many academic and professional societies, including the American Institute of Electrical Engineers, Institute of Radio Engineers, American Physical Society, the American Academy of Arts and Science, and the Society of Sigma Xi.

In April 1942 Dr. Bowles was called to Washington by Secretary of War Stimson to act as his consultant on radar, communications, and allied fields. Later he was consultant on communications to the Commanding General, Army Air Forces. He was given over-all responsibility for all Air Forces communications, including radar and radar bombing, navigational aids, and electronics applications. In this capacity he was empowered to act directly for General Arnold.

Dr. Bowles rendered outstanding service to the country through his contributions to the development and application of radar and other important electronic developments for military uses and in establishing policy and implementing plans for the Army in a variety of technical fields. On November 14, 1945 he received the Distinguished Service Medal.

It is expected that the placing of his long experience and profound technical knowledge in these fields at the disposal of Automatic Electric Company will prove of great benefit to the company's research and development program.

$1,000,000 Plans

The Commonwealth Telephone Company, Madison, Wisconsin, plans to spend $1,000,000 this year for improvements, according to Walter Dakin, president, which will include expansion of rural service and installation of more dial telephones.

The company president said Commonwealth's improvement program would be handicapped by material and labor shortages, but predicted that even more money would be spent on improvements when supplies become available.

Mr. Dakin revealed that the company's program this year called for expansion of rural service, installation of dial equipment in several exchanges, increasing toll facilities at some points and rehabilitation of company exchanges.

Dial equipment manufacturers are flooded with orders for equipment, but Commonwealth expects to receive enough for several exchanges this year as a result of orders placed prior to the war.

Mr. Dakin said dial equipment had been ordered for additional exchanges and engineering and architect's plans have been prepared for additional dial conversions.

Consider Sale

The stockholders of the Amberg Tel. & Tel. Company, Wausaukee, Wisconsin have been considering the advisability of selling, but to date no reports have been received as to a decision.

Ayers Joins Copperweld

D. Paul Ayers, formerly division engineer of the Kansas Power & Light Company, at Topeka, Kansas, has joined the Sales Engineering Staff of Copperweld Steel Company, Glassport, Pa.

A graduate of Kansas State College, Mr. Ayers has a background of 18 years' practical experience in the design, construction, operation and maintenance of electrical transmission and distribution systems. Just prior to his affiliation with Copperweld, he supervised the installation of one of the largest substations in the Midwest.

D. F. Ayers

Reject Bell's Offer

The Farmers Telephone Company (Frankenmuth, Mich.) stockholders have rejected the offer of Northwestern Bell to take over their line.

Walter Zuellig, president of the Farmers company, announced that they have decided to continue the stock company for a year and that they hope to secure wire and other parts for their new subscribers.

Consolidate Signal Corps Installations

The Signal Corps' field installations at or near Fort Monmouth, N. J. are to be consolidated under the Fort Monmouth headquarters for administrative functions. The center of Signal Corps training since 1919, Fort Monmouth will administrate for the Eastern Signal Corps Training Center and Signal Corps Board at Fort Monmouth; the Signal Corps Engineering Labs, Bradley Beach, and the Army Electronics Standards Agency and Ground Signal Patent Agency at Red Bank.

Consistent with the Signal Corps' move for economy of facilities and personnel, the reorganization will eliminate duplication and overlapping duties.

FCC Authority

The FCC authorized the A.T.&T. to lease from the Lincoln Telephone & Telegraph Company, Nebraska, two telephone channels extending 64 miles from Brock to Plattsmouth, Nebr. Rental for the lines is $1,860 per year for the Socony-Vacuum Oil Co. pumping station at Brock.

New Installations

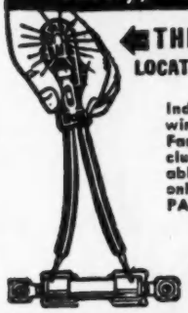
Kellogg Switchboard and Supply Company, Chicago, announces the completion of five new Kellogg Relaymatic installations in Illinois, Arkansas, Missouri and Florida.

Three of the new Kellogg installations are of 100 lines capacity. They are Brownstown, Ill., Holcomb, Mo., and Pottsville, Ark.

Kellogg Relaymatic boards of 50 lines capacity have been installed in Elmira, Ill., and Wewahitchaka, Fla.

Test-O-Lite

TESTS ANY VOLTAGE . . .
100 to 550 Volts, A.C. or D.C.
Safely, Swiftly, Surely



THE NEON GLOW
LOCATES TROUBLE -INSTANTLY

Indicates hot or grounded wires. Tells AC from DC. Far superior to ordinary clumsy test bulb. Indispensable in shop or home. The only pocket-size tester with PATENTED SAFETY FEATURE.

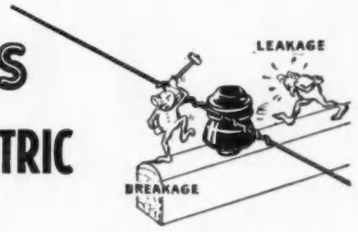
Life-time guarantee. List $1.50. Purchase thru electrical dealers. Pat. No. 1,778,883.

RTC-2 VINCENT RARE GAS RELAY

for harmonic or coded bells. Dual purpose device which economically improves both ringing and transmission on party lines. NO MOVING PARTS. Fully guaranteed. Can be installed in a minute.

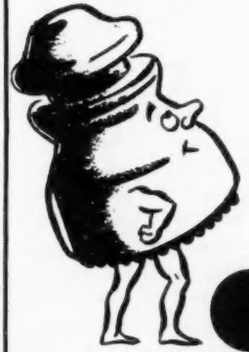
L. S. BRACH Mfg. Corp.
200 Central Avenue Newark, N. J.

INSULATORS
from AUTOMATIC ELECTRIC



Stay on the Job!

Once installed, insulators from Automatic Electric "stay on the job" . . . fighting rain and sun, heat and cold. They're made by Hemingray or Armstrong—of clear, non-porous glass, carefully annealed for greater strength and long life. And they're carefully inspected for all possible flaws before shipment.



For lower maintenance costs, ***insulate with the best.*** Choose Hemingray or Armstrong—the insulators that "stay on the job." We can supply insulators for any project. Choose yours from the Automatic Electric catalog.

Recommended and Distributed By

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1033 WEST VAN BUREN STREET, CHICAGO 7, ILL.

LINE and DESK

Edited By
J. S. REED, JR.

Q. What effect does the internal resistance of a voltmeter have on the accuracy of the readings?

A. Voltmeters should always have a resistance sufficiently high so that the accuracy of the readings is not affected. This is especially true where the resistance of the voltage source is high as when determining the amount of foreign potential existing in a high resistance fault. To illustrate the effect of connecting a low internal resistance voltmeter to a high resistance circuit, suppose we are measuring the voltage across a circuit having a resistance of 3000 ohms. The source voltage is 150 and the full scale reading of the meter is 150 volts. The meter is 100 ohms per volt. The total meter resistance is 100 x 150 = 15,000 ohms. Current through the source and the meter together is:

$$I = \frac{E}{R} = \frac{150}{15000-3000} = .008333 \text{ amp.}$$

$V = IR = .008333 \times 15000 = 125$ volts, voltage reading

$E - V = 150-125 = 25$ volts drop due to source resistance.

If the meter had been 1000 ohms per volt instead of 100 ohms per volt, the meter resistance would have been 150,000 ohms. resulting in a reading of 147 volts, a negligible drop of 3 volts.

When measuring a foreign potential in a high resistance circuit, excessive drop in the meter can be minimized by using the highest voltage scale on which a reading can be satisfactorily obtained. Thus in the case of a 15-150 volt meter, the 150 volt scale would be less subject to error on account of the higher series resistance of the meter.

Free Help on Problems

If you don't see a ready answer to your questions, let TELEPHONE ENGINEER's staff of technical men tackle it for you. This is a free service. Your question and the resulting answer may not only solve your problem but help the many other telephone men reading these columns. Jot your questions on a postcard and look to LINE and DESK for reply. If your problem needs immediate attention, enclose a stamped return envelope for mail reply.

Q. Would you give me the diagram of a pushbutton magneto system that will not make the line noisy due to the grounding of the central office drop?

A. Figure 1 illustrates a circuit that has been found successful in eliminating inductive interference on pushbutton magneto lines. The pushbutton is arranged to short the line during the time the central office is being rung. One side of the line drop at the office is connected to the line through a center tapped retard coil and the other side of the drop goes to ground. The effect of this arragement is to balance the line with respect to ground to eliminate longitudinal currents resulting from power line induction.

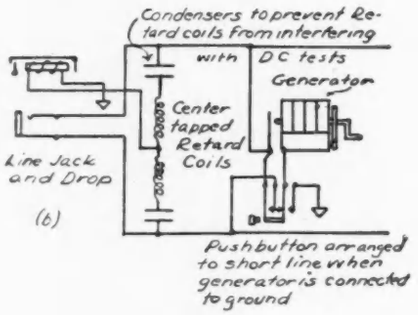

Condensers to prevent Retard coils from interfering with DC tests
Generator
Center tapped Retard Coils
Line Jack and Drop
(6)
Pushbutton arranged to short line when generator is connected to ground

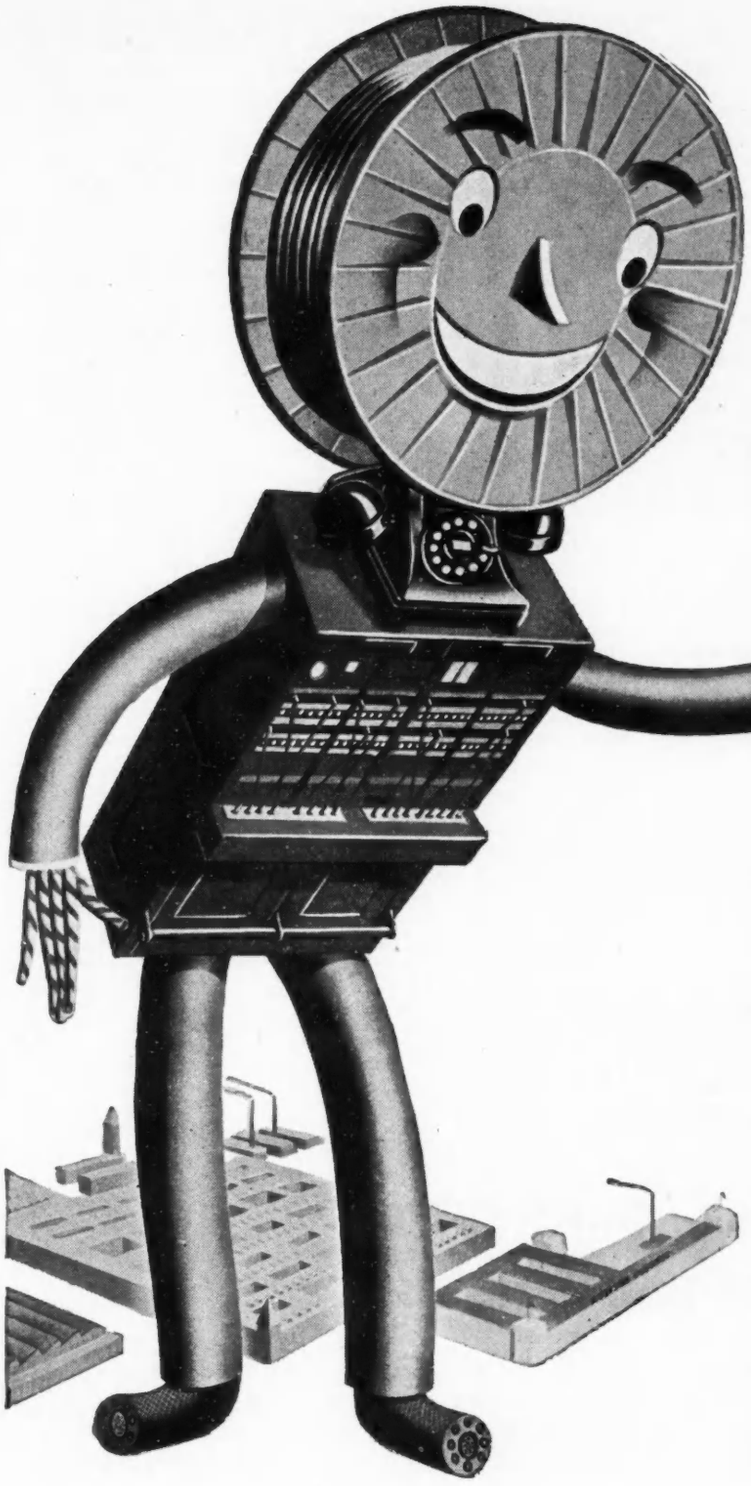
Fig. 1—Circuit used to prevent inductive interference on push button magneto lines.

Q. We install small diameter station ground rods (copperweld in our exchange) and expect to salvage the rods in event of station disconnections. What would be a simple method of removing these ground rods?

A. We suggest that you employ a pair of sleeve twisters for removing this type of ground rod. Clamp the tool on the rod just below the copper wire lead, twist the rod in the round and pull it up by hand. Keep turning the rod as you pull on it and it will come out quite easily.

Q. In what situations should we use angle bolts and straight bolts of the thimbleye type, also thimbleye nuts?

A. The angle thimbleye bolt is intended for the attachment of a guy to a corner or dead-end pole where the lead/height ratio of the down guy is 1.25 or less, and the straight thimbleye bolt is utilized where the lead/height ratio is 1.25 or greater. The thimbleye nut is used for dead ending a cable messenger on the same through-bolt employed for the down guy, also for attaching one of the strain insulators at a dead-end or corner pole in a long span lead of high strength steel wire. The use of the thimbleye nut obviates the need for another through-bolt on the same pole.



"Sure, I've made 41,000,000 telephones

. . . but what else do I make?"

"I *do* make good telephones and I'm proud of every one of them.

"But your Bell Telephone would be completely silent without the *other* things I produce to go with it.

"Wire for instance . . . miles and miles and miles of it. Acres of reels of cable . . . thousands of intricate switchboards . . . delicate electronic apparatus to improve your long distance calls. And that's only the beginning . . .

"That's just my *manufacturing* function for the Bell System. (I've been at it since 1882.) I'm *purchaser* for the Bell telephone companies, too. I *distribute* equipment to them throughout the nation. I even *install* central office equipment.

"I've helped to make our nation's telephone service the best in the world and the most economical.

"My name? Remember it : : :

"It's Western Electric!"

MANUFACTURER... of 43,000 varieties of telephone apparatus.

PURCHASER... of supplies of all kinds for telephone companies.

DISTRIBUTOR... of telephone apparatus and supplies.

INSTALLER... of telephone central office equipment.

FOR THE BELL SYSTEM

Western Electric

Win Suit on Failure to Supply Service

The complaint of a doctor against the New York Telephone Company for damages due to the failure of the company in wartime to supply service through the recapture of residence extension telephones is not a cause of action, the New York Supreme Court ruled.

In the court's opinion, the company was unable to supply service to the plaintiff because it lacked instruments, and it was not compelled by duty to recapture residence extensions of existing subscribers to serve the new applicant. There was no violation of the New York Public Service law nor of the State Commission's rulings by the New York Telephone Company.

Buys Jeep

H. M. Duckworth, manager of the Havana Telephone Co., Indianola, Nebraska, has purchased a new civilian-type Willys Jeep, to be used by the company as a mobile construction repair unit.

The new vehicle is equipped with all the latest devices for construction and repair work on the company's many miles of lines.

The new Willys Jeep is finding favor among utility companies because of its defiance of rough terrain. Here a couple of trouble-shooters for Toledo Edison Company reach telephone poles in deep cut and heavy fill areas. Signal Corps photo.

Large Plant Outlay

The Northwestern Bell Telephone Company's construction expenditures are expected to approximate $100,000,000 in the next few years for necessary replacement of telephone plant and provision for growth.

Northwestern Bell had a net gain of 35,996 telephones during 1945 bringing the total number of telephones at the end of the year to 1,069,188, which includes a yearly gain in rural phones of 6,176.

Automatic Issued License

A license has been issued to the Automatic Electric Company, Chicago, telephone equipment manufacturers, covering a recent invention for use on wire telephone systems. The inventor is Harry W. Becker, chief engineer of the Electronic Sound Engineering Co.

This invention, covered by Patent No. 2,389,949, provides for rural telephone circuit channels on telephone or power lines by the use of carrier current frequencies. Its principal advantage over existing carrier systems is that power for operating the entire system is derived wholly from the telephone central office, the power being sent out over the same wires as are used for the multiple transmission of telephone conversations and programs. This feature helps to insure the continuous operation of all circuits and connections, since the system is independent of commercial or battery power supply at the remote end.

Terms of the agreement are for a 17-year period.

GS&IC

Technical and Advisory Service By Communication Specialists

Gary Services and Investment Company, as the general service agency for companies of the Gary Group, is staffed with able and experienced personnel who need no introduction to the Independent telephone field or to the communication field in general.

Through the facilities established for service to the Gary Group, the Company is well fitted also to extend advice and assistance, on technical matters or matters pertaining to legislation and regulation, to friends and customers of Gary Group companies.

Mr. Samuel R. Ryan, as manager of the Company's Washington office, will give such matters his personal attention.

GARY SERVICES AND INVESTMENT COMPANY

(A Wholly-Owned Subsidiary of Theodore Gary and Company)

Head Office: 1100 King Street, Wilmington 33, Delaware

332 S. Michigan Avenue
Chicago 4, Illinois

Munsey Building
Washington 4, D. C.

Stromberg Appoints D. L. Solomon

David L. Solomon

Frederic C. Young, Stromberg-Carlson vice-president in charge of engineering and research, has announced the appointment of David L. Solomon as assistant chief telephone engineer. Mr. Solomon will assist Dr. H. R. Reed, chief telephone engineer, in the supervision of the company's XY system program. John H. Levis, who is also assistant chief telephone engineer, will continue his present supervision of the company's switchboard production program, Mr. Young said.

A native of Chicago, Mr. Solomon was graduated from Purdue University in 1936 with the degree of Bachelor of Science in electrical engineering. He has been associated successively with the Western Union Telegraph Company of Chicago as transmission engineer, with the estate of H. M. Friendly of Chicago as consulting telephone engineer, and with the Federal Telephone and Radio Corporation of Newark as assistant chief engineer.

Mr. Solomon is a member of the American Institute of Electrical Engineers and of the communications section of the Association of American Railroads.

Improvements

Indiana companies report construction and improvements are being made as rapidly as possible; Southern Indiana Tel. Co. and Ohio River Telephone Co. have completed an additional copper toll circuit between Aurora and Rising Sun; the Nappanee Telephone Company has completed three new toll circuits, ordered 24,000 feet of cable and 20,000 feet of underground conduit and will place a new switchboard position in service this summer.

Walkie-Talkie News

In view of the fact that Army surplus walkie-talkies and other radio transmitting equipment are now being offered for sale in some stores over the nation, the Federal Communications Commission warns that the unauthorized use of such transmitters by the general public is illegal and may subject the user to a $10,000 fine or imprisonment or both.

Under the Communications Act no person may operate a radio transmitter without first obtaining a license from the FCC.

No licenses will be issued by the Commission for the walkie-talkie and other transmitters by the general public, except in the Amateur Service, until the Citizens Radiocommunication Service, designed to govern such use, is put into effect. A simple licensing procedure requiring only a minimum knowledge of the regulations is contemplated.

The Commission also points out that none of the Army surplus walkie-talkie equipment which has come to its attention is built to operate in the 460-470 megacycle band allocated for the Citizens Radiocommunication Service.

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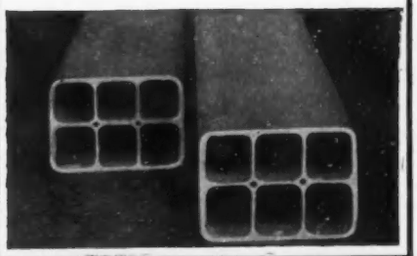
The proved and standard Protection for Underground Telephone Cables.

Cheapest in the long run. Highest quality and a full line of shapes.



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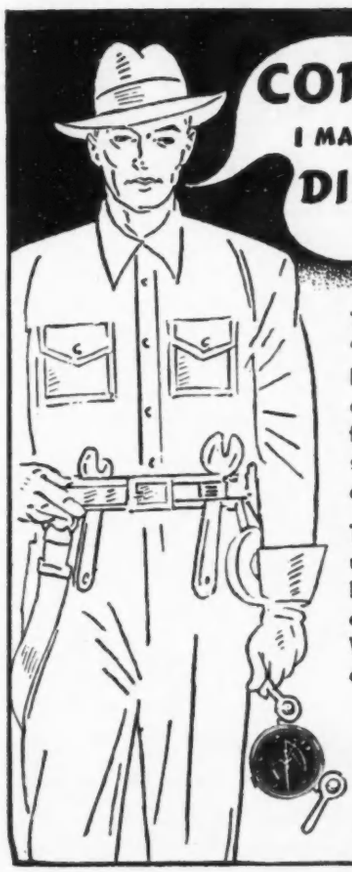

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DILLON DYNAMOMETER

There's no guesswork—no questionable "sight and sag" when an accurate Dillon Dynamometer is on the job. Easy to use and easy to read, this compact instrument pays for itself in a short time in time and material saved. Models rated as low as 500 pounds and up to 20,000 pounds.

Thousands of Dillon Dynamometers are in use today! For guys, conductor, strand or high tensile wire. Figures are large, readings are direct in pounds. No charts, no figuring. Write today for illustrated folder listing capacities and *low* prices!

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. . . to handle and sell a wide variety of

ELECTRONIC EQUIPMENT

released for civilian use

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REMLER

SINCE 1918

Radio *Communications* *Electronics*

Radiotelephone Features

"Telephone secretarial service" and selective ringing are features of the mobile radiotelephone system exhibited by Western Electric Company at the I. R. E. convention.

This new FM development, designed by the Bell Telephone Laboratories for installation in vehicles operated in urban areas, will make immediate contact with any telephone reached by the Bell System.

To make a call from the vehicle, you merely remove the handset, give the operator your number, press the button in the handset while talking, and release it while listening. At the beginning and end of a day's operation a power switch must be turned.

To make a call to the vehicle, you simply ask for the "Mobile Service Operator." Each car will have an individual telephone number so that only the bell in the vehicle called will ring. If you are absent when called, a light will be glowing in the control unit upon your return, and you may request the operator to advise you who called.

Compact and lightweight, this equipment comprises a radio transmitter, radio receiver, control unit, antenna and cable. The control unit containing a hand telephone of standard design is mounted under the dashboard, and the antenna is mounted on top of the automobile. The remainder of the equipment need not be visible in its mounting.

The equipment is designed to withstand the rigors of service in a moving vehicle with a minimum of maintenance. Transmission performance is comparable to other Bell System service.

The radio receiver, of the superheterodyne type, is highly sensitive and quartz crystal controlled. The radio transmitter, also quartz crystal controlled, is frequency modulated and has an output power of at least 15 watts. Operating power for the mobile telephone is derived from a heavy duty 6 or 12 volt car battery with oversize generator. Standby power is 60 watts. Frequencies, pretuned and crystal controlled, range within 152-162 megacycles.

Peterson to Montevideo For Automatic

With a background of 25 years of broad practical experience in various commercial, engineering, and administrative positions in the telephone field, Alfred W. Peterson, a member of the staff of Associated Telephone Services, Limited, technical consultant and administrative service organization for the Theodore Gary and Company Group, will shortly leave for Montevideo, Uruguay, where he will represent International Automatic Electric Corporation as resident engineer.

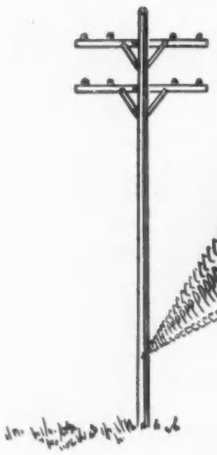
A. W. Peterson

In this new capacity, Mr. Peterson will assume charge of the extensive changes in central office equipment which will be involved in the rehabilitation and expansion program now

LEADING TELEPHONE COMPANIES STANDARDIZE ON

PENTA POLES

'46 P&H PPPPPPPPPPPPPPPPPPPPPPPPPPPPPENTA



They are light in weight. Easier to transport and set.

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"STILL IN THE LEAD"

being undertaken in Montevideo by the Administracion General de las Usinas Electricas y los Telefonos del Estado, the autonomous Uruguayan government administration in charge of telephone, electric light and power service.

Robert H. Ehret Joins Electric Products Company

The Electric Products Company, Cleveland, Ohio, announces the addition of Robert H. Ehret to the Headquarters Sales Staff. Mr. Ehret will be responsible for handling headquarters sales negotiations.

Robert H. Ehret

Mr. Ehret brings to his new position a broad experience in electrical sales and engineering gained from a year and a half of training with General Electric Co. and Electric Machinery Manufacturing Co. plus 11 years selling, applying and installing apparatus manufactured by the Burke Electric Co.

Increase Rates

Authority to increase rates at its Haskell, Oklahoma exchange upon installation of common battery, has been granted the United Telephone Company by the Oklahoma Corporation Commission as follows:

	Old Rates	New Rates
Business 1 party (hand set)	$2.90	$3.25
Business 2 party (hand set)	—	3.00
Business extension	1.00	1.00
Residence 1 party (hand set)	1.90	2.00
Residence 2 party (hand set	—	1.75
Residence extension	.50	.50

Directory Rates

Both the Manteca (Cal.) Telephone Co. and the Ripon (Cal.) Telephone Exchange are seeking directory advertising rate changes from their state commission.

Revise Tariffs

The Michigan Bell Telephone Company has been authorized by its state public service commission to revise its private line teletypewriter service tariff and teletypewriter exchange service tariff, to establish rates and charges for additional service and equipment, to delete rates and charges for certain present service and equipment and to make minor textual changes.

Unattended Dial

The Pennsylvania Telephone Corporation, Erie, Pa., has been authorized to furnish service in the borough of Bear Lake and vicinity, Warren County. Bear Lake Telephone Company formerly maintained an exchange in the vicinity but abandoned service in 1944. The Pennsylvania company proposes to install an unattended dial central office in Bear Lake connected to an attended central office at Corry, Pa.

Seeks Increase

The Griggs County Telephone Company, Cooperstown, N. Dak., has before its state commission a request for increased telephone rates and also is asking that the Glenfield, Juanita, McHenry Rural Line be improved.

ALL the strength and durability inherent in steel are combined---with definite economies---in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

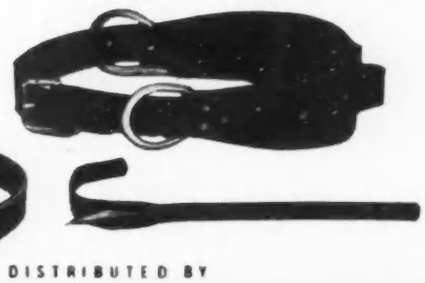
Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

Play Safe!

Working aloft in all kinds of weather, the telephone lineman deserves the safest equipment that money can buy. Give him confidence in his own safety, by providing him with belts, straps and climbers made by KLEIN—producers of fine linemen's tools since 1857. Telephone men everywhere recognize this name as a synonym for complete reliability—so, for safety's sake, always

Specify **KLEIN**



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A NEW, IMPROVED—

UNIQUE SPLICERS FURNACE

• Melts 50 Lbs. of Solder in 10 Minutes

Basically the same fine furnace used by larger Utilities for 20 years - Now with

- **FINE FLAME CONTROL**—keeps solder at "just the right temperature."
- **"QUICK CHANGE" GENERATOR**—removed and replaced in 60 seconds.
- **WIND-PROOF**—housing shields generator—No extra shield is needed.

Additional Features: Long-life figure "8" generator—with orifice scraper. Rugged semi-steel top plate. Powerful pump. 16 gauge welded steel tank with bottom shock ring. Size 8" x 13". Weight—15 lbs. Popular size for 6", 7", and 8" pots.

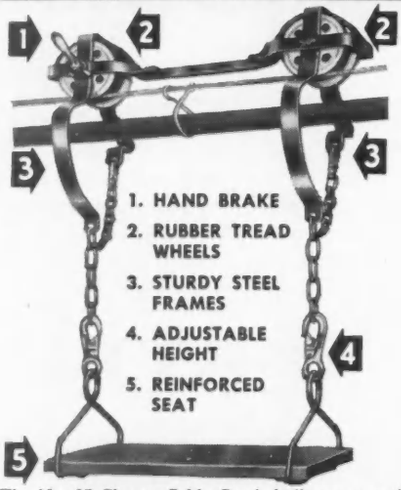
No. 55-I—KEROSENE No. 53-I—GASOLINE

If clear white gasoline is hard to get, order the Kerosene Furnace. You'll like it.

We Invite An Approval Test

UNIQUE MANUFACTURING CO., INC.
221 W. Walton St., Chicago 10, Ill.

CHANCE CABLE CARS
Make the Job Safer and Easier



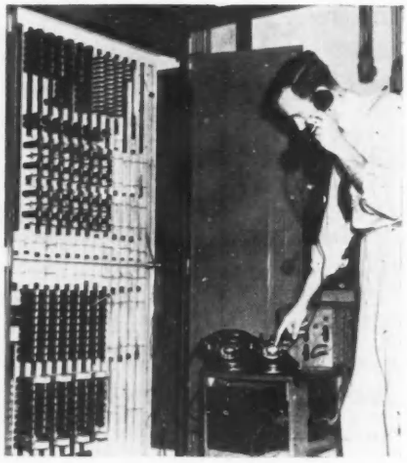
The No. 27 Chance Cable Car is built to meet the most exacting specifications for safety and performance. The hand brake stops the car and holds it anywhere on the messenger. Lightweight Aluminum rubber cored wheels ride smoothly over hundreds of thousands of rings without appreciable wear. Sturdily constructed steel frame and reinforced seat will last a lifetime—seat is easily detached and adjustable in height for comfort and convenience.

Chance Cable Cars were used by the Armed Forces. They are built to give you the same exceptional service. For more information, write today.

A·B·CHANCE CO. • CENTRALIA MISSOURI

Reduce Rates

The Tri-County Telephone Company, South Haven, Michigan, and the Union Telephone Company, Owosso, Michigan, recently received approval from the Michigan State Public Service Commission to reduce their intrastate rates for toll service at distances of 340 miles and more. This reduction is due to the universal reduction in toll service throughout the state.



Testing one of the dial phone relay bays produced by Stromberg-Carlson. Richard Faige, telephone switchboard inspector, plans to be quite busy since Stromberg-Carlson is doubling its telephone equipment output to meet the needs of its Independent customers.

New Booklet

A new booklet on resistors is now ready for distribution to telephone men. Jot your name and address on a postcard and send it to Ward Leonard Electric Company, 31 South St., Mount Vernon, N.Y. and the new D-2 booklet with complete data on wire-wound vitreous enameled resistors for use in telephone and radiotelephone fields will be sent you by return mail.

To Purchase Property

The Midwest Telephone & Utilities Co., Inc., Petersburg, Indiana, has asked its state commission's permission to purchase the Spurgeon (Ind.) Home Telephone Company.

Grant Certificate

The Madison (Ill.) Telephone Company has been granted a certificate by the Illinois Commerce Commission to operate a telephone system in the area now served by the Bethalto and Moro (Ill.) Mutual Telephone Companies.

As fast as material and labor can be obtained, the Madison company will build a new common battery plant in Bethalto.

Vote Sale

Voters of Grand Rapids Township, Minnesota authorized the town board to sell three township-owned lines because the cost of maintaining them, exchange costs and rental fees to the Northwestern Bell are more than the revenue derived from the lines.

NRECA Committee to be Named in August

According to our Washington Bureau, appointment of the 10-man committee of the National Rural Electric Cooperatives Association to cooperate with the telephone industry in the development of rural telephone service probably will be delayed at least until August. The NRECA Executive Committee will make the appointments, and it is not scheduled to meet until late summer.

At the same time, the service intracommunication committee, to deal with radio communication between the cooperatives, also will be named. Both bodies will be selected on the basis of one man for each of the 10 NRECA regions. The intracommunication committee, it is expected, will be divided between advocates of FM and those favoring carrier transmission.

M. L. Parkin with A. B. Chance Company

M. L. Parkin, who for the past seventeen years has been associated with the Missouri Power and Light Company in all phases of utility work, recently joined the A. B. Chance Company to handle one of their tips tool demonstration and display units.

Mr. Parkin will act as demonstration engineer in the midwestern states, working in cooperation with the district sales managers of these territories.

M. L. Parkin

Col. Grable Joins Staff Of Automatic Electric

Colonel John C. Grable

Colonel John C. Grable, recently retired from service in the Army Air Forces, has joined Automatic Electric Company in the capacity of staff engineer, according to an announcement by W. J. Caverley, president of the Company. Col. Grable had been in the military service since 1917, and at the time of his retirement was Chief, Operations Division, Air Communications Office, Headquarters, A. A. F.

In his new capacity, Col. Grable will engage in technical and advisory duties on matters dealing with the design, manufacture and operation of communications and other equipment for the Army Air Forces and the Army Service Forces, and will also maintain contact with military authorities and civilian customers with the objective of assuring satisfactory performance of the Company's equipment and apparatus in service.

Before entering the service in 1917, Col. Grable served for 13 years with various telephone and other utility companies. His work in these fields included engineering, maintenance and construction of outside plant, and central office maintenance and operation.

Early in his military career, he graduated from the Signal Corps Company Officers' Course and the Field Artillery School, and served in the Philippines, Panama, French Indo-China, and Japan. Originally commissioned in the Field Artillery, he was transferred to the Signal Corps in 1928 and detailed in the Air Corps in 1944.

During the early thirties, and again during the period from 1938 to 1941, Col. Grable served as Chief of the Wire Division, Office of the Chief Signal Officer. His duties in this capacity included the operation, maintenance, engineering and installation of all Army post telephone exchanges, and target range and Seacoast Defense fire control systems. He also organized the decentralized system of construction and installation in the United States and possessions, and was responsible for the formulation of standardized methods of operation and maintenance of wire communication systems throughout the Army, his duties involving the operation of a group of telephone systems having over 300 exchanges with a total of 105,000 telephones.

In his recent assignment as Chief of the Operations Division of the Air Communications Office, Col. Grable was responsible for the operation of the world-wide Army Airways Communications, and exercised staff supervision over fixed radio and wire facilities of the A. A. F., including the construction, maintenance and operation of 652 base telephone systems, 148,000 miles of leased telephone and teletype networks, and the A. A. F. TWX, weather, and flight control networks. In this capacity also, he represented the A. A. F. on various government and military boards and committees having to do with communication matters.

During the war Col. Grable served for two years as deputy to the Chief Signal Officer at Gen. MacArthur's headquarters in the Southwest Pacific theatre. After returning to the United States in 1944 he was assigned to the General Staff, 2nd Air Force, Colorado Springs, Col., during the intensive training of B-29 bomber organizations. In 1945 he was selected for inclusion on the General Officer's Eligible List.

Col. Grable's long experience with the communication requirements of the various branches of the Army and his thorough knowledge of procedures and policies in these fields are expected to be of valuable assistance to Automatic Electric Company and its customers in the engineering and supply of communication equipment.

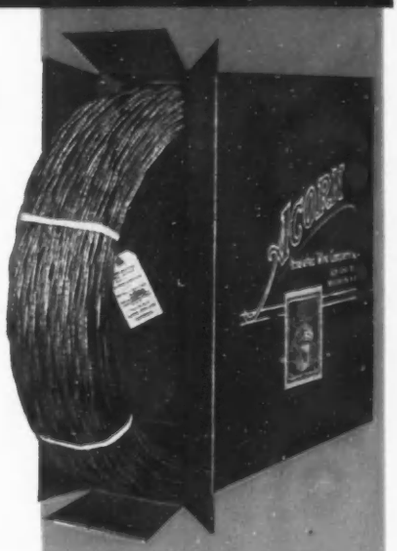
Increased Rates With Dial

The Central Telephone Company, Ivanhoe, Minn., is increasing its rates upon conversion to dial. The Minnesota Railroad & Warehouse Commission authorized an increase from $2.25 net per month on business individual lines to $3.50 net.

ACORN INSULATED WIRE

TODAY TELEPHONE WIRE has to be tough

Many years of specialization in the manufacture of communication wire has built a performance record for Acorn Drop Wire.



ACORN INSULATED WIRE COMPANY, INC.
225 King Street, Brooklyn, N. Y.
LEICH SALES CORP., 427 W. Randolph St., Chicago
LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland

ACORN'S exclusive Carton packaging preserves carefully developed QUALITY until installed . . .

Drop Wire—Bridle—Interior—Tree—Ground—Switchboard—Pothead—Cable Terminal—Instrument—Fixture—Buried Wire

TROUBLE-FREE

Thats' a simple expression, but it means everything to a telephone man.

It is achieved in telephone instruments by simple design and rigid assembly such as you get in

LEICH HANDSETS

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SUTTLE EQUIPMENT CO.
Lawrenceville, Illinois

DEPEND ON SUTTLE

Radio Course for Telephone Men

(Continued from page 44)

for receiving from the mobile installations. This plan necessitates some additional equipment in the mobile stations and this complication would need to be weighed against the cost and inconvenience of separate radio transmitters for each of the channels.

With this system, the radio transmitter is located at or near the telephone office and the receivers would usually be located at some point remote from the central office in order to isolate them from each other and to place the receivers in relatively quiet locations.

Use of Carrier Current Wave Filter Systems for Large Toll Groups

With the unique Lenkurt group modulator carrier current system it is feasible to get as many as twenty-seven telephone channels and eleven telegraph

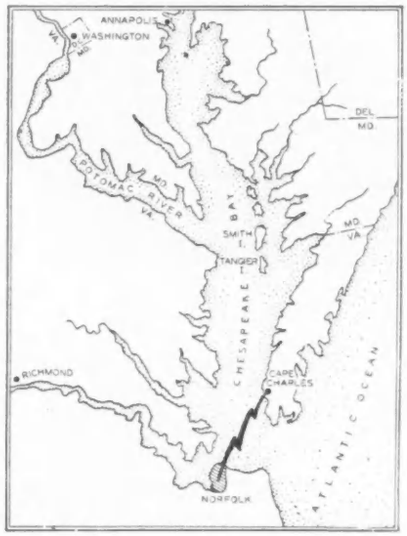

Fig. 191—Typical application of a multi-channel radio link (Courtesy Bell Laboratories).

channels over a single radio carrier as shown in Fig. 190. An arrangement such as this, might prove useful in connection with an installation requiring a large number of toll circuits between two points.

It will be noted that channels one to ten embrace a band of frequencies extending from 200 to 34,650 cycles. Channels 11 to 19 pass through a group modulator and are elevated to 37,350 to 60,600 cycles. Channels 20 to 28 go through a group modulator which boosts them to 74,550 to 105,600 cycles.

Existing Installations Employing Wave Filter Carrier Systems

There are already several installations in the United States which make use of multi-channel carrier systems in connection with a single radio link. One of the best known of these is one which links Norfolk and Cape Charles, Virginia across Chesapeake Bay. This link spans twenty-five miles of water and makes it unnecessary to extend service via land line over a route approximately 400 miles in length. This is, of course, an ideal application of a radio link as will be apparent from a study of Fig. 191.

This installation which was made in

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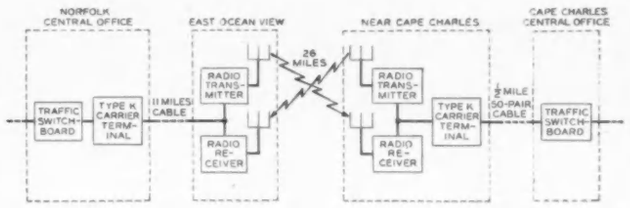

Fig. 192 — Block diagram of the Norfolk - Cape Charles twelve channel radio link. (Courtesy Bell Laboratories.)

1941, provides 12 channels over a radio carrier operating in the 152-162 megacycle band. Modulating equipment similar to that used in the 12 channel type K cable carrier system is used to obtain the multiplicity of channels. The frequency band used embraces a range extending from 12,000 to 60,000 cycles. Two hundred foot steel towers support the antennas at each terminal. The antennas are parallel arrays of half-wave elements giving good directivity. An R.F. band of 120 kilocycles is employed. Automatic gain control is employed in the receiver and compensates for variations and loss in the radio path. Fig. 192 illustrates schematically the general arrangement of the terminal equipment at each end of this radio link.

New Building

The Illinois Bell Telephone Company plans to erect a new four-story fireproof addition to their Peoria (Ill.) central office building.

B. W. Ford, manager, reports that the exterior of the new building, which will be modern in design, will be constructed of limestone with granite and greenstone trim. The frame of the building will be structural steel, the floors and roof reinforced concrete. It is expected that this addition will be completed early in 1947 and together with the initial dial equipment installation and outside cables, will cost about $675,000.

Application of Carrier Current Systems to Radio Links

1—What are three possible ways in which multi-channel operation via radio can be obtained between two points?

2—State some of the objecttions to using separate radio systems for each required channel.

3—Explain the essential difference between the carrier current type of multi-channel radio link system and the pulse-time-division multi-channel system.

4—What are some of the advantages of the multi-channel carrier current system over the pulse-time-division system?

5—Can "wire type" carrier current systems be used to obtain multi-channel operation over a radio link?

6—Explain the advantage of the special signalling method available with a Lenkurt carrier system.

7—What determines the frequency band width required on the radio channel for a multi-chanel system?

8—Can the multi-channel carrier current method be used in conection with urban mobile radiotelephone systems where more than one channel is required?

This powerful ringing converter has proven its efficiency under the severest operating conditions. Has no wearing parts assuring a long, dependable, trouble-free life.

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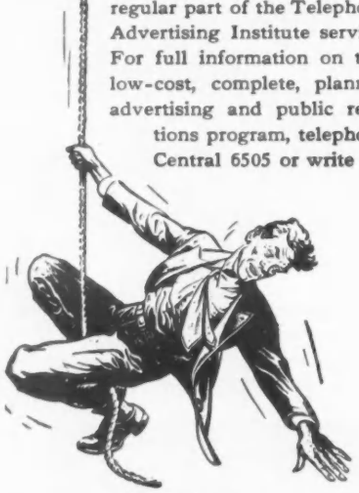

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Request Increase

The Great Bend (North Dakota) Telephone Company is seeking authorization of increased telephone rates from the North Dakota Public Service Commission. Also before the North Dakota commission is the Fullerton (N.D..) Telephone Company's application for higher rates.

Ernest Watson Cited By War Department

Signally honored by the War Department was Ernest W. Watson, general commercial superintendent, Associated Telephone Co., Ltd., Santa Monica, Cal., for outstanding service rendered in expediting the war program as a liaison agent between the Associated company and the military agencies.

L. to R.: C. F. Mason, pres., Assoc. Tel. Co.; E. W. Watson, gen. com. supt. of company, recipient of award; Colonel A. M. Pigg, Harold V. Bozell, pres., Gen. Telephone Corp., N.Y.

At the luncheon in Mr. Watson's honor, C. F. Mason, president of the company and master of ceremonies said: "For me, there is much personal pride in this award to Mr. Watson. During the war the people of our company—both men and women—worked as a co-ordinated, enthusiastic team, and they are proud now that a member of their team has brought distinction to their company. Mr. Watson acted as direct liaison between our company and the armed forces, and he was the member of our team to whom the requirements of the Army were first made known in each instance. He and his assistants, by their untiring efforts and application, established the pattern of determination and performance demonstrated throughout the emergency by all of the members of our team. Today when the Army has made this award to him, we are honored that Mr. Watson is one of us."

The presentation was made by Col. Albert M. Pigg, as representative for Secretary of War Robert P. Patterson and the War Department. Decorated with an embossed gold seal of the U. S. War Department, the citation reads, "The War Department expresses its appreciation for patriotic service in a position of trust and responsibility to Ernest W. Watson in acknowledgement of outstanding services rendered to the War Department as general commercial superintendent, Associated Telephone Company, Ltd., Santa Monica, California, from December 1942 to April 1946. His consistent display of vigorous enthusiasm, painstaking interest, disregard for obstacles and ability to obtain the active cooperation of his associates enabled the company Mr. Watson represented to meet Army requirements for telephone service in numerous large and important Army institutions on schedule, thus greatly expediting the war program."

Present at the luncheon were Harold V. Bozell, president of General Telephone Corporation; C. F. Mason, president of the Associated Company; G. T. Ellis, general auditor; D. M. Barnes, chief engineer; M. K. Taylor, attorney; C. H. VonHake, general commercial supervisor; F. E. Norris, vice president; T. A. Osborne, general plant superintendent; W. T. Luck, assistant general commercial superintendent; O. G. Jarboe, general traffic superintendent; E. W. Watson, general commercial superintendent; Col. Albert P. Pigg; Col. James W. Barnett; and Capt. William M. Hupalo.

As they entered the Los Angeles Country Club, Colonel Pigg recognized Mr. Bozell as an engineering professor under whom he had studied at the University of Oklahoma 40 years ago. Mr. Bozell has been in Santa Monica for the past few weeks on a combined vacation and business trip.

Reduce Intrastate Rates

The Michigan Public Service Commission has authorized the Michigan Associated Telephone Company, Muskegon to reduce intrastate rates for message toll telephone service involving distances more than 340 miles. in order to comply with universal reductions now in effect. The new rates are in effect retroactive to February 1, 1946.

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Convention Dates

Oregon Telephone Association, Multnomah Hotel, Portland, June 21 and 22.

California Telephone Association, Miramar Hotel, Santa Monica, June 27 and 28.

South Dakota Association, Hotel Carpenter, Sioux Falls, September 11 and 12.

Michigan Telephone Association, Hotel Olds, Lansing, September 18 and 19.

USITA National Convention, Stevens Hotel, Chicago, Illinois, October 14, 15, and 16.

North Carolina Telephone Association, Pine Needles Hotel, Southern Pines, November 11 and 12.

South Carolina Telephone Association, hotel not selected as yet, November 14 and 15.

Alabama Telephone Association, Jefferson-Davis Hotel, Montgomery, November 18 and 19.

Georgia Telephone Association, Henry Grady Hotel, Atlanta, November 21 and 22.

Florida Telephone Association, Marion Hotel, Ocala, November 25 and 26.

New Strowger Office At Richmond, Indiana

Better than normal traffic growth at Richmond Home Telephone Company's "Main" office in Richmond, Indiana, has resulted in the addition of a new "West" office, comprising 400 lines of Strowger Automatic equipment, supplied and installed by Automatic Electric Company.

A feature of the new automatic equipment is that by the use of switching-selector-repeaters, it has been made possible to list the new "West" office stations under the company's universal numbering scheme without use of an extra digit.

Richmond Home Telephone Company is one of the pioneer users of Strowger equipment, the first installation having been made in 1907, and replaced with new Strowger equipment 30 years later. By this addition, the company's system now totals approximately 9,400 automatic stations, including Richmond "Main" and "West" offices, and a C-A-X of 81 lines at Boston, Indiana.

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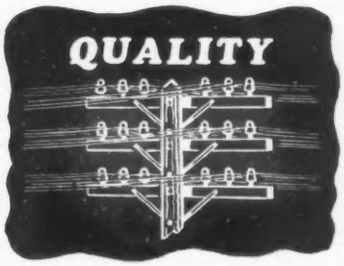

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Portable Pumps and Generators

(Continued from page 27)

from 130 to 160 volts. Batteries of this type are used primarily in the larger plants for plate supply to voice repeaters.

Other units available are suitable for charging 24 and 48 volt batteries. The power capacity of these special emergency charging units ranges from 750 watts to 2,000 watts in five different models.

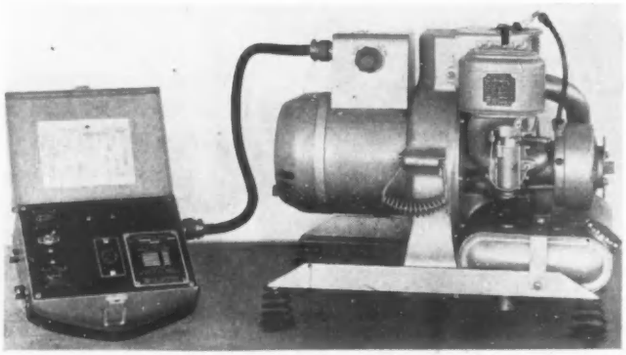

Fig. 5—Special direct current portable charging generator for use during power outages.

Photos courtesy Homelite Corp.

Inasmuch as they are arranged to charge the battery directly, they are somewhat more efficient than when emergency power is generated on an a-c basis and passed through the normal central office battery charging rectifier.

Fuel Consumption of Portable Generators

The amount of fuel consumed by the portable power plant is amazingly low, and ranges from 5 hours per gallon at full load for a small 750 watt unit, to 1¾ hours per gallon for the 2,500 watt unit at full load. It can be seen that the power cost, considering the time in use, is very small. The high speed gasoline engines used in the modern portable generators are simple and relatively trouble free. They require little maintenance and have low annual operating costs. There are now a variety of models for emergency standby power for telephone exchanges to choose from.

Fig. 6—Portable self-priming engine-driven pump being used by telephone company to pump out a flooded manhole. Homelite's current model 1952 is dewatering the manhole.

Some of the larger telephone companies have found that by placing these portable charging units at strategic locations through their operating territory, a few units will take care of a number of exchanges. When an emergency occurs, a unit can be quickly moved into the exchange affected by a power outage.

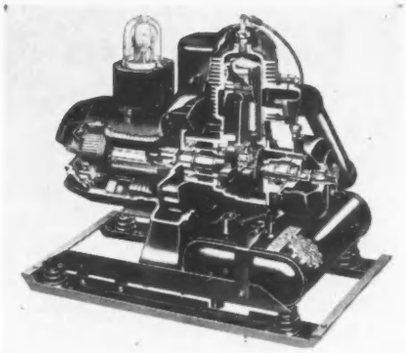

Fig. 7—Sectional view of a Homelite portable generating unit.

Power Pumps

In localities where manhole flooding is not an uncommon occurrence, a gasoline engine driven portable centrifugal pump is another piece of power equipment that will pay its own way. Although pumps can be improvised from small centrifugal units driven by electric motors, these will seldom answer the need for various reasons. If a pump is required, it is usually needed at once and a delay may be costly. When an important feeder cable goes out, due to water in a manhole, it is imperative that the water be removed and the defective splice opened and corrected in a minimum of time.

A portable centrifugal pump which is ideally suited to utility company application is shown in Figure 6. Unlike most centrifugal pumps this pump is *self-priming*. This feature is valuable as it does away with the necessity of working with foot valves and makeshift priming methods during an emergency when time is precious. The automatic priming feature permits a 5 foot suction lift to be obtained within 15 seconds after starting the pump and a 25 foot suction lift in 100 seconds. The total lift of the pump shown is guaranteed to be 28 feet. It is capable of operating against a total head of 80 feet.

Another characteristic of these pumps which makes them well adapted to emergency applications is the fact that the impeller is of the open type. Its large clearance allows free passage of mud and solids which insures trouble free operation. These pumps are available in sizes which will handle either 10,000 or 15,000 gallons of water per hour. If water logged underground conduit systems after heavy rains is one of your headaches, a portable engine driven pump will go far in solving your problem.

Some interesting booklets are being put out on the inside story of these light-weight gasoline-engine-driven generators, and if you would like to have full information on portable power plants, just mail a postcard to *Telephone Engineer's* New Products Editor.

Telephone Engineer

HANDBOOK TABLES

POLE GUYING DATA

Index—Pole Line Design
Date — June 15, 1946

Pole guys are required at locations in telephone lines where the wire or cable load is not balanced, resulting in the possibility of the supporting poles being distorted or pulled out of line. Such line unbalances occur at angles, branch-offs, dead ends, or grade changes in the line.

Two factors that are important in determining the stress in a pole guy are the **height** from the ground line of the pole to the attachment of the guy on the pole and the **lead**, or horizontal distance from the pole to the point where the anchor enters the ground. The relation between these two terms is shown in Figure 1 which also gives the formula for the stress in a down guy at a dead-end point. The importance of having as large a lead/height ratio as possible is shown in Table 1. Generally it is preferable to obtain a lead/height ratio of not less than 1.0 and not more than 1.25. Increasing the lead/height ratio beyond 1.25 is not economical.

Table 1—Showing effect of lead/height ratio on guy tension when line load is 1000 pounds

Lead/Height	Total Guy Tension in lbs.	Lead/Height	Total Guy Tension in lbs.
0.1	10,000	0.8	1,600
0.2	5,100	1.0	1,400
0.3	3,500	1.25	1,280
0.4	2,700	1.5	1,200
0.5	2,240	1.75	1,150
0.6	1,950	2.0	1,120

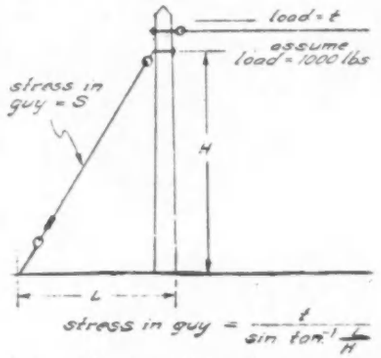

Fig. 1—Showing relation between lead and height.

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Stromberg-Carlson Appointment

N. W. Baldwin has been named Stromberg-Carlson's Rochester telephone sales manager, Arthur F. Gibson, the company's assistant general sales manager, announced recently.

Mr. Baldwin will have direct supervision of telephone salesmen, sales engineers, and other personnel assigned to telephone and switchboard sales in the busy Rochester telephone sales department. The territory embraces everything east of the Mississippi except the states of Illinois, Indiana, and Michigan.

Mr. Baldwin returned to the government contract department of the home office in 1940 after serving for 25 years as vice-president and general manager of the Stromberg-Carlson Company Limited of Toronto, Ont. Since 1941 he has filled the important liason post of contacting armed forces communications equipment procurement officers in Chicago, Ill., Dayton, O., and Philadelphia, Pa. He joined Stromberg-Carlson 40 years ago and prior to his service with the company subsidiary in Canada, he had worked for eight years in the drafting and engineering departments and had spent two years in the field as a telephone salesman.

N. W. Baldwin

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Omaha Nat'l Bldg., Omaha 2, Neb. 6908 Market St., Upper Darby (Phila.) Pa.

To Acquire Stock

The General Telephone Corporation, New York, N. Y., has before its state commission an application to acquire all the capital stock of The Walden (N. Y.) Telephone Company.

Exides Used on Radar-Guided Bombs

One of the highly secret uses made of Exide batteries manufactured by the Electric Storage Battery Co. of Philadelphia during the war was that of radar-guided bombs. These bombs, launched from Navy planes flying outside of the range of enemy guns, were guided by radar to their targets miles away. Regardless of any defensive maneuvers the enemy target ship would make, the radar-directed bomb would follow it until it struck. Called "Bat" bombs, they destroyed many tons of Jap shipping during the last year of the war. They were the first fully automatic guided missiles to be used successfully in combat by any nation.

Operating on somewhat the same principle as live bats, which give out a short pulse of sound and pilot themselves by the echo, the robot bats were guided by the radar echoes from targets. "Bat" bombs were approximately 12 feet long, with a 10-foot wing span and carried a heavy load of high-explosives, and were dropped by Navy Privateer patrol bombers. Each bomb was equipped with an Exide battery.

Transfer Property

The White Water Valley Telephone Company, Beaver, Minn., is transferring all its telephone property to the Wabasha County Telephone Company, Plainview, Minn.

Be Ready for

MAJOR EMERGENCIES

Fires---Floods---Sleet Storms---Hurricanes

TELEPHONE and power companies are periodically called on to meet what might be termed a *major emergency*. Sleet storms, hurricanes, disastrous fires, etc., strike seldom but when they do, they create a major problem for those utilities whose properties are spread over a wide area; hence, are particularly susceptible to the elements. Progressive telephone and power companies have found that it pays to have a *master plan* carefully worked out and tucked away in the files. This plan is pulled out and used as a blueprint for meeting an emergency when it does arrive.

A good example of advance emergency planning is the practice of some of the New England power companies. The Boston Edison Company, for example, had such a master plan in effect when the 1944 hurricane swept into the New England states and interrupted the service to some 184,000 out of 400,000 customers served. As a result of the plan, within 48 hours after the storm had passed, all but 10,000 of the customers whose service was interrupted had been restored to full service. The remaining 10,000 were cared for within three days after the storm had passed. In a previous hurricane and in the absence of a master plan to guide the restoration effort, almost 100,000 customers were still out of service at the end of three days, and it was almost two weeks before all service had been fully restored.

The Power Company Master Plan

The power company master plan consists essentially of setting up an *emergency organization* which is directed by an *emergency administrator*. This organization is operated by a selected staff that is charged with the responsibility of initially setting up the master blueprint and administering it during a declared emergency. Under this plan the emergency organization functions only when some special conditions prevail. It is called into operation by the president or general manager of the company.

Under the emergency administrator are various *coordinators* of the different phases of the company's operations which are normally affected by an emergency of major proportions. The relationship of the various coordinators to the emergency organization is shown in Chart No. 1. During the period of an emergency, the emergency administrator in collaboration with the general headquarters staff is empowered with full authority over all company activity.

The net result of this organizational setup is that there is no lost motion and all plant and service restoration work proceeds in an orderly and efficient manner with the least amount of "back tracking." Among other things the plan contemplates employment of extra help. Carefully indexed data permits extra help to be quickly located and obtained and put to use to supplement regular

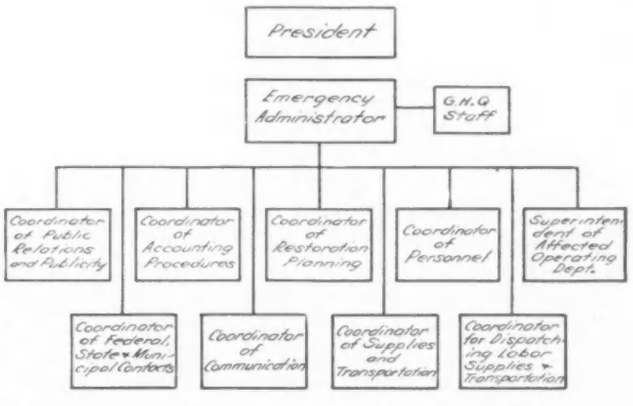
President
Emergency Administrator
G.H.Q. Staff
Coordinator of Public Relations and Publicity
Coordinator of Accounting Procedures
Coordinator of Restoration Planning
Coordinator of Personnel
Superintendent of Affected Operating Dept.
Coordinator of Federal, State & Municipal Contacts
Coordinator of Communication
Coordinator of Supplies and Transportation
Coordinator for Dispatching Labor, Supplies & Transportation

Chart No. 1—The emergency staff.

Charts by courtesy of Edison Electrical Institute.

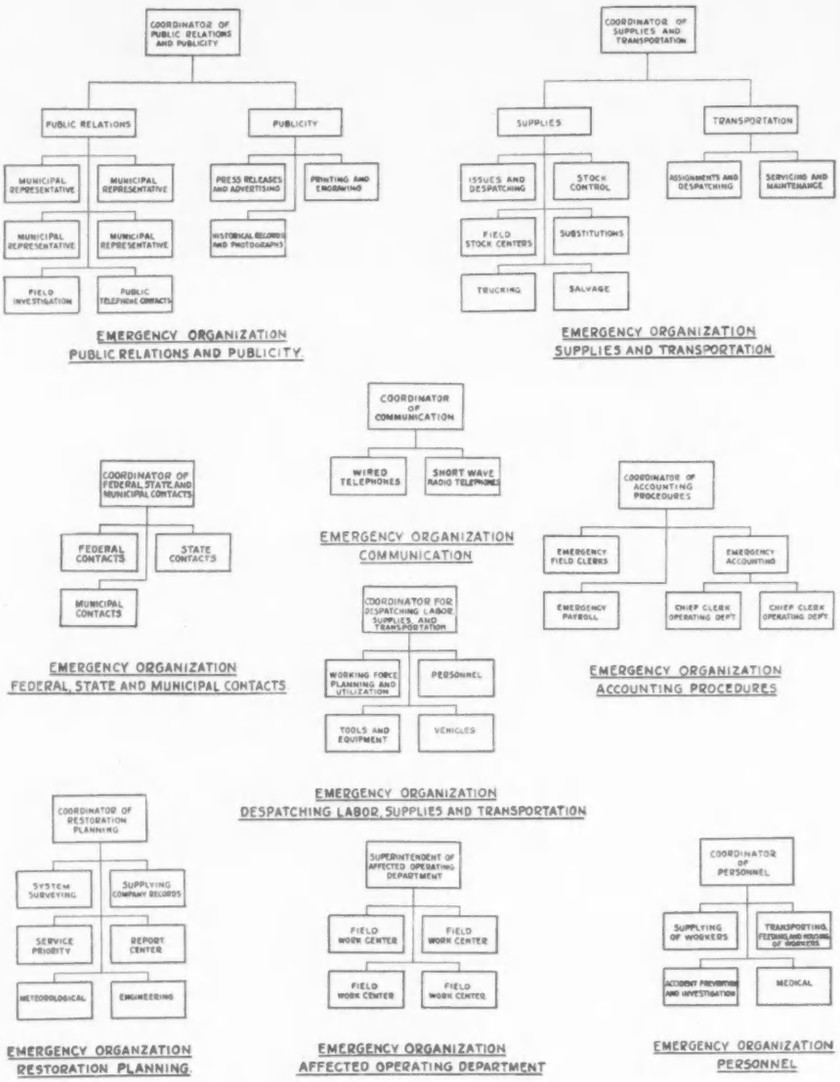

Chart No. 2—Activities under the supervision of each coordinator.

crews. Additional trucks, assurance of ample supplies of emergency repairs, special methods of initially restoring service on a temporary basis, are all planned for in advance. All of these various details are worked out in the master plan.

Coordinator of Responsibilities

Responsibilities of the various coordinators include such items as public relations and publicity; federal, state and municipal contacts, worked out in advance, which are often necessary to obtain assistance during this restoration work; and availability and use of short wave radio for providing a communication network during restoration proceedings, carefully planned in advance with such details as licensed operators, equipment, etc.

One of the principal initial responsibilities of the emergency group is to make a *system survey* to determine the overall extent of the damage and its location and to suggest the approximate material and manpower requirements. Even such details as making certain that company records are not thrown off by the lack of proper accounting procedure during the emergency repairs comes under the supervision of one of the coordinators. A detail of the organizational responsibilities of the several coordinators is shown by Chart No. 2.

Although the plan shown is for a power company and is probably more elaborate than would be required for any except the larger telephone companies, it can serve as a guide and pattern that can readily be modified to fit the telephone field. Any telephone executive who has experienced a major emergency, such as a fire or storm, can well appreciate the value of having a well-defined plan worked out for meeting any emergency and in the files ready to be used when the emergency arrives.

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It operates directly from the 110 volt, 60 cycle lighting circuit and takes the place of the two dry cells now used. Easy to install. Quality made for a long life of dependable service. Costs only $4.50.

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Because the Sturgis Standard Metal Chair, No. 435-A, is tops in comfort and convenience, it is the telephone operator's favorite chair.

It features low maintenance cost, efficiency and economy.

The Sturgis Standard is built ruggedly of steel tubing, 1″ thick for the base and ¾″ thick for the circular footrest. The seat, which measures 16½″ wide and 14½″ deep, is covered with genuine brown leather, as is the curved, plaited back. All padding is curled hair. The back is 8″ high, 13″ wide . . . ready for delivery *now.*

Chair Height Specifications

Seat Height Adjustment	Footrest Height from Floor	Seat Height Adjustment	Footrest Height from Floor
18″ to 22″	5″	24″ to 28″	10″
20″ to 24″	6″	26″ to 30″	12″
22″ to 26″	8″	28″ to 32″	13″

sturgis low chairs... *designed for comfort!*

The Sturgis Low Chairs, now available, assure complete working comfort for chief operators, information operators, etc.

They also possess the same low-maintenance features which have made Sturgis Standard Operator's Chairs the favorite in the industry.

The frame is of 1″ steel, smoothly welded at every joint. The back is adjustable without tools or special keys in a matter of seconds, and the seat height can be raised or lowered within 17 to 21 inches. The full saddle seat measures 15¼″ x 16¾″. You may specify either imitation or genuine leather upholstery. The curved, plaited back and the seat are both padded with comfortable, long-wearing curled hair.

Place your order today for immediate delivery.

hemingray insulators
dependable...in any weather!

No matter how fierce the attacks of summer heat or winter cold, you can count on famous Hemingray Insulators to stand up to the job.

Neither rain nor snow, sleet nor hail has any affect on the faithful service of Hemingrays. Favorably known since 1870, these insulators are products of Hemingray Division of Owens-Illinois and are manufactured under their rigid laboratory inspection.

Many of these Insulators are in service today after 20, 30—and even 50 years. The installation cost is low—but with Hemingrays the cost in service life is even lower.

Hemingray No. 10: The exchange line pony with double groove. Standard on many telephone lines the world over.

RGCARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

KANSAS 8, SAN FRANCISCO 3; IN CANADA: STROMBERG-CARLSON COMPANY LIMITED, TORONTO

STROMBERG Telephone CARLSON

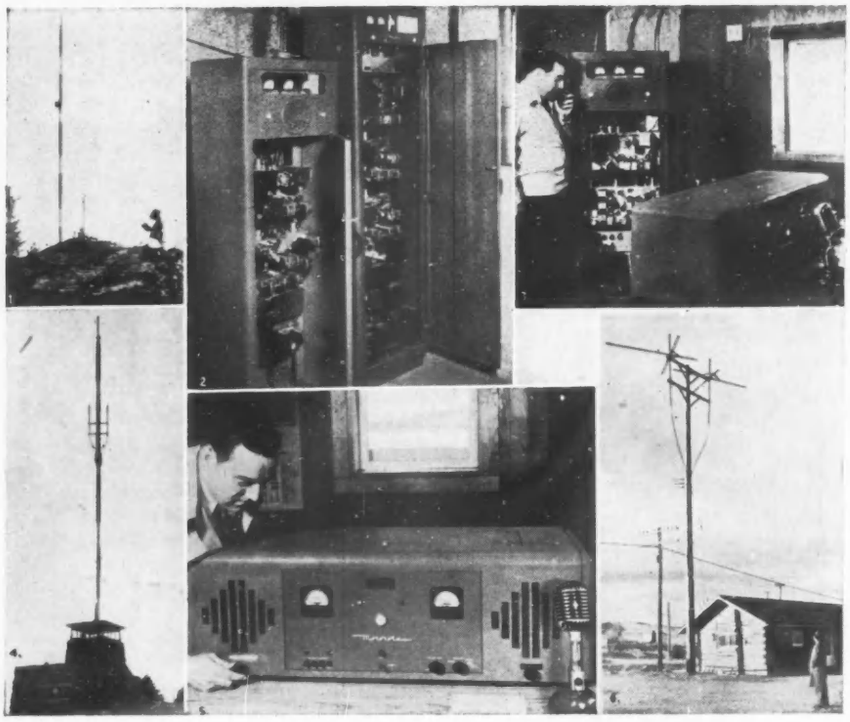
Radio-Controlled Mountain Transmitters

Thar's more than gold in them thar Black Hills! Two mountain-top radio-controlled Motorola F-M transmitters have been added as part of the state-wide police radio system.

Entirely unattended, the Motorola 250-watt transmitters blanket the western half of the state, and can be actuated independently or made to "talk" in unison by means of a low-power high-frequency triggering link between the mountains and Rapid City, S.D. sub-headquarters, 30 miles away.

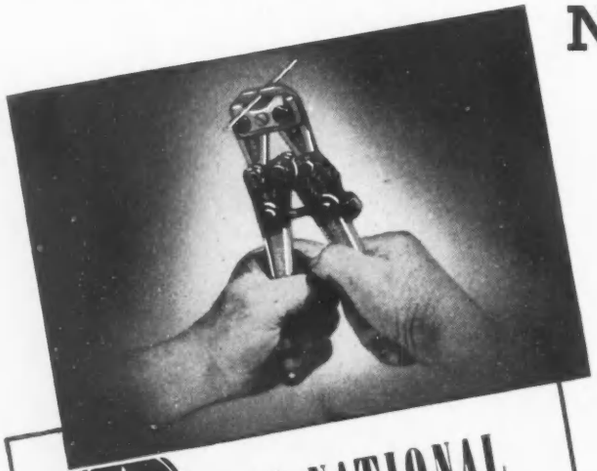
Instrumental in making the mountains talk via radio control instead of storm susceptible landlines was the team of Boylan and Jones. Rugged radio-plague country was their problem. But with the aid of hot coffee and slide rules, Motorola's communication engineer, Horace Boylan, and M. Jones, chief radio engineer of the state police system, designed an ingenious beam antenna which successfully "squirted" the necessary signal strength to trigger the Terry Peak and Coolidge (Custer, S.D.) large transmitters.

The unique radio system, which uses equipment made by the Galvin Manufacturing Corporation of Chicago, owes its inception to the cooperative action of State Attorney General George T. Mickelson and Les Price, chief agent of the Attorney General's Law Enforcement Division, S. Dak.



This unique radio system, which uses equipment made by the Galvin Mfg. Corp. of Chicago, Ill., is now in operation by South Dakota police over mountain ranges. Tests have shown that whether behind peaks, overhanging rocks, etc., there are no "dead" spots; the signal is always there solid.

For Permanent Splices . . . . Do It The NICOPRESS WAY



THE NATIONAL TELEPHONE SUPPLY CO.

The NATIONAL line includes: tools and sleeves for splicing, tap-offs, reducing, repairs, and dead ends; cable hangers, Marline cable hangers, Zinc-wraps and Adjust-a-Straps.

With Nicopress Sleeves, you are assured of permanent joints—stronger than the line itself, and your best protection against noisy joints and line failure.

Linemen prefer the Nicopress way because the sturdy Nicopress tools are light, compact and simple to use. They know that once a job's completed with Nicopress — it's spliced to stay. Start using Nicopress now, and save time, money and labor.

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CLAY, HARDPAN, SHALE AND FROZEN GROUND

make for TOUGH DIGGING . . .

. . . But the Highway Model HD Earth Boring Machine takes them all in stride. Holes from 6″ to 20″ diameter, from 7′ to 10′ deep, straight down or at an angle, can be completed in less than two minutes! But that's only half the story:

This same machine, equipped with integral winch and derrick, sets poles 40′ to 45′ long, weighing 2000 to 2500 pounds. That means doing away with the expense of an extra line truck and extra crew to set the poles!

Leading engineers and maintenance superintendents go all-out in their praise of Highway equipment. That's because this equipment is designed by men who are thoroughly familiar with the job to be done. Highway Line Construction and Maintenance Bodies, Highway Pole and Cable Reel Trailers, Highway Winches and Power Take-offs deserve your investigation. Write today!

HIGHWAY TRAILER COMPANY

Manufacturers of: Utility Bodies • Winches • Earth Boring Machines • Pole and Cable Reel Trailers and other Public Utility Equipment.

General Offices: **EDGERTON, WISCONSIN, U.S.A.**

An ADDITIONAL TELEPHONE CHANNEL

OVER EXISTING OPEN-WIRE LINES AND CABLES

Telephone companies, railroads, power, oil, pipeline and other companies having privately-owned communication lines will find the FTR 9-A-1 Carrier Telephone System indispensable for additional telecommunication facilities... permanent or temporary ... without need of outside plant expenditures.

This Single Channel Carrier Telephone System provides high-grade communication over 300 miles ... with intermediate repeaters it is applicable on lines 1,000 miles or more, depending on the gauge of open wire conductors, length of intermediate cables and number of bridged stations.

Small in size, light in weight... the arrangement of its components permits maximum accessibility and affords the utmost flexibility in choice of operating features to meet many diverse performance requirements.

The FTR 9-A-1 features interchangeable terminals, two or four wire termination, built in ringer ... all "Firsts By Federal". Write for complete details now.

COMPACTNESS | **ACCESSIBILITY** | **FLEXIBILITY** | **SEALED UNITS** | **EASILY INSTALLED**

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See for Yourself the Advantages of Drop Wire Jacketed with

DURABLE, WEATHER-RESISTANT NEOPRENE

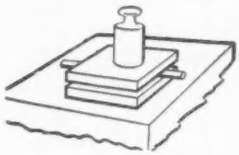
WE SUGGEST you make these tests yourself with samples of commercial neoprene-jacketed drop wire. You'll see that the neoprene jackets can really take it.

We supply crude neoprene to wire manufacturers who compound it into jackets for telephone drop wire, portable cords, aerial cable, riser cable, railroad cable, and many other types of wire and cable products. In every case the neoprene jacket gives the wire resistance to abrasion, cutting, sunlight, ozone, weather, oil and grease, and aging and oxidation. You'll find neoprene jackets on the best wire and cable. Always specify neoprene jackets when you buy.

WRITE FOR your free subscription to *The Neoprene Notebook*. Keeps you up to date on new uses for neoprene in plant equipment. Back file available on request.

MAKE THESE TESTS YOURSELF

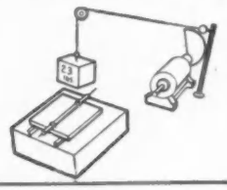
Pressure increased to point of failure



1. COMPRESSION TEST

See how the neoprene-jacketed wire stands up when crushing pressure is applied.

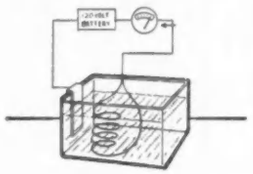
25 blows per minute, 6½-inch drop



2. POUNDING TEST

See how long it takes to crush a neoprene-jacketed wire when weight is dropped on wire repeatedly. Shows the ruggedness of neoprene for tough installations.

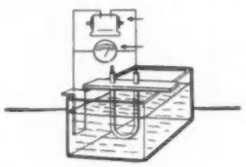
120-volt battery and galvanometer



3. INSULATION TEST

See how little leakage there is when neoprene-jacketed wire is immersed in water. Shows the better electrical properties of wet drop wire when neoprene jackets are used.

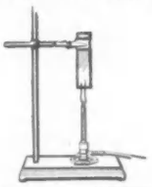
High-voltage generator and voltmeter



4. BREAKDOWN TEST

See how much voltage you can apply to neoprene-jacketed wire immersed in water before failure.

Du Pont vertical tube flame test



5. FLAME TEST

Prove to yourself that neoprene does not propagate flame in this Underwriters test. Shows why neoprene will not carry a flame into a building.

Exposed under strain to sunlight, weather

6. WEATHER TEST

See how neoprene stands up under sunlight, temperature changes or smoke and chemical fumes. Long-term tests show neoprene jacket is in good condition after ten years of service.

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Wilmington 98, Delaware

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THE *VERSATILE* SYNTHETIC RUBBER

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Repair services for Transmitters, Receivers, Desk Stands and Wall Phones—Magneto or Common Battery.

Specialists in Repairing and Rebuilding Transmitters

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Old telephones or parts into smart modern-looking wall phones or desk sets with new cabinets.

Telephone Repair & Supply Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

Radiotelephone Distribution

Kellogg Switchboard and Supply Company, Chicago, and the Philco Corporation have announced an agreement whereby FM mobile radiotelephone facilities will soon be made available to the nation's 12,000 communities served by the independent telephone industry.

The working agreement between the two corporations was made public in a joint statement issued by John Ballantyne, president of Philco Corporation and James H. Kellogg, president of Kellogg Switchboard and Supply Company.

Briefly, the agreement means that Kellogg Switchboard and Supply Company, pioneer manufacturers in the independent telephone field, will furnish and install FM mobile radiotelephone equipment for the Independent telephone field manufactured expressly for Kellogg by the Philco Corporation under an exclusive distributing agreement.

By means of the agreement the engineering talent of both Kellogg and Philco are made available for the design of mobile radio telephone equipment best suited to the particular requirements for this type of apparatus.

Mobile radiotelephone units under the Kellogg-Philco Agreement will be designed primarily for use in private automobiles, trucks, buses, taxicabs, yachts, and other vehicles and will incorporate the latest electronic development.

Mobile radiotelephone calls will be handled by mobile service telephone operators at the local central office. The conversations will travel part of the way by telephone wire and part of the way by radio. If a caller wants to talk to the occupant of a truck somewhere between the call point and the truck's destination, he will ask for the mobile service operator and give her the call number of the vehicle. The operator will then send a signal on to the vehicle by radio. The truck operator will receive an audible and visual call signal whereupon he will pick up his dashboard receiver and answer.

Similar radiotelephone equipment will also be used to extend telephone service to remote farming areas which cannot now be reached economically by conventional telephone systems.

Ohmite Series 84 Riteohm Precision Resistors

New "Series 84" in Types 844B, 844A, and 842A, is the latest addition to the Ohmite Riteohm Precision Resistor line which includes the Riteohm Series 71, 81, 82, 83 and 90. This new series was developed to meet the demand for a precision resistor capable of being mounted by means of a through-bolt and equipped with a radial lug at each end.

The Riteohm is pie-wound to 1% accuracy and is available in 3 sizes—9/16" diameter by 9/16" long, 9/16" diameter by 7/8" long, and 3/4" diameter by 1-3/16" long. The smallest is a 2 pie while the other two are 4 pie units. The minimum resistance is 1.0 ohm for the 2 pie unit and small 4 pie unit, and .10 ohm for the large 4 pie unit. The maximum resistance is 200,000 ohms for the 2 pie, 400,000 ohms for the small 4 pie, and 1.5 megohms for the large 4 pie unit.

For further information, write for Bulletin No. 126 to our New Products Editor.

Service Complaint

The North Dakota Public Service Commission is considering a complaint before it regarding the telephone service of the Guelph (N. Dak.) Farmers Telephone Company. A public hearing was held May 28.

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New 2 Cond. Rubber covered Tinsel Swbd. cords 5 foot fit Kellogg No. 42 W. E. No. 47 and Leich Plugs @ 42c Lots 10 or over each ..... .40
Kellogg Transfer Jacks 5 per strip—Fits Kellogg No. 42 Plugs @ 2.00
Dean 4 Party Harmonic push button Swbd. keys with listening key attached @ 2.50
Western Elec. No. 56A ring off drops on Mtg. Strips 10-15 or 20 per strip per drop @ 1.00
New Universal Receiver shells and caps fits Kellogg, W. E. Leich, Auto. Elec. and practically all makes slip type Rec. Units @ ..... .45
New Kellogg, W. E., Automatic Elec. or S. C. Mouthpieces @ ..... .08
Stromberg Practically new 2 Cond. Swbd. Plugs fits S. C. No. 11 Drop @ ..... .40
New Kellogg or W. E. 2 Cond. magneto Swbd. plugs @ ..... .70
Kellogg No. 22 Local or C. B. Transmitters complete with Mouthpieces less backs @ 1.25
Kellogg Practically New Linesmans test set with 4 Bar Gen. 1600 ohm ringer complete with batteries @ 15.00
Cook No. 10 or No. 8 Main frame arresters with heat coils and carbons banks of 20 lines per strip @ 8.00
W. E. No. 1001-C Lineman test set all metal type with push button switch hook in handle and 3 Cond. Cord @ 5.00
Auto Elec. A. O. Enclosed gong steel signal sets with booster coil Cond. and 1400 ohm biased ringers @ $6.50—without Ind. Coil @ 5.50

REBUILT ELECTRIC EQUIPMENT CO.
1704 West 21st Place
Pilsen Station, Chicago 8, Ill.

CLASSIFIED ADS

WANTED: Telephone men for Chicago factory. Steady work, good wages and working conditions. To rebuild telephones magneto switchboards. Telephone Repair & Supply Co., 1760 Lunt Ave., Chicago, Tel. ROGers Pk. 3818.

WANTED: Combination Plant Man to maintain both inside and outside plant of Common Battery exchange. Permanent employment and good wages. Write Oklahoma Telephone Company, Broken Arrow, Oklahoma.

PLANT ENGINEERS WANTED: Experienced men for permanent positions. Work to include designing aerial and underground cable plants and open wire lines in exchanges of 5,000 to 8,000 stations to be converted to dial operation. Must have good knowledge of transmission and supervisory values. State age, experience, education, etc. Write Box 8433, Telephone Engineer.

WANTED: Outside Plant Engineers and Transmission and Protection Engineers for large operating group in the Middle West. Exceptional opportunity for advancement. Submit age, qualifications, and a small snapshot. Box No. 8439 c/o Telephone Engineer.

WANTED: Outside Plant Supervisor for Class "A" midwestern telephone company. Excellent opportunity for a man with ability. Write giving age, experience and references. Box 8440 c/o Telephone Engineer.

DISTRICT COMMERCIAL MANAGER WANTED: By large, growing independent telephone company. Excellent opportunities for the right man. In application supply full information as to availability, number of dependents, age, education, experience, present employment and references. Attach recent photograph. Write to Box 8434, Telephone Engineer.

WANTED TO BUY: Veteran with some cash and some backing available, successful experience in management Independent telephone company, wishes to buy on fair basis substantial interest in, and become manager of small telephone exchange or system, at least 750 stations, with prospects for expansion; in South or Southwest. Age 30; married; health good. Replies will be kept confidential. Address Box 8432 c/o Telephone Engineer & Management.

For Sale

FOR SALE: Immediate delivery, #22 triple braided rubber covered olive green interior wire @ $14.15 per 1,000 feet. Address Telephone Repair & Supply Company, Rogers Park Station, Chicago 26, Illinois.

TO HIGHEST BIDDER: 3-position Kellogg K-100 Multiple PBX Switchboard, equipped with 200 lines, 45 CB cord circuits, Relay Rack, Floor MDF, two ringing equipments, rectifier, storage battery, battery rack, cabling and runway. Used from July 1943 to February 1945. For details communicate with F. M. Strasser, Supervisor of Supplies, Lincoln Telephone & Telegraph Company, Lincoln 1, Nebraska.

Position Wanted

POSITION WANTED: By discharged veteran, age 25. 4½ years in Army Signal Corps, 7 years in telephony, graduate of Teletype maintenance course, also of Automatic Electric Co. Telephony Course. Have engineered 3-5 position manual installations, also 1000 line automatic installation. Now employed as Wire Chief of 600 line Automatic installation. Desire to locate in Ohio, Indiana, Illinois, Kentucky, Missouri, with expanding Independent Telephone Co. Must be permanent. Write Box 8438, c/o Telephone Engineer.

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And they're *precision-built* — under *exacting step-by-step quality production control!*

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American makes six basic lengths—and offers 60 optional equipment items.

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1 Flat-top Wheel Housings
2 Platform extension—non-skid steel plate
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5 Weatherproof Roof Enclosure
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7 Derrick Tunnel
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10 Swivel-type Material Hooks
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13 Extended Sheave Bar Brackets.

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NOISE *means* WEAR

Something is wearing out–slowly but surely.

Wear means maintenance and replacement.
Wear means costs.

Listen, if you will, to an ALL RELAY central office carrying a heavy traffic load — you will be impressed by the complete silence.

Examine the operating costs of the same exchange and you will have the rest of the story.

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